CIRCULATES IN EVERY PROVINCE IN CANADA

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied fields. Published by the MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XIV | Publication Office: Toronto, November 11, 1915 | No. 20

Librarian
Univ. of Toronto.
Engl Bldg. Fac. of

Red Cut High Speed Steels

Just now, when the attention of every user and buyer is riveted on the high speed steel situation, we feel that a brief statement from the makers of Red Cut is appropriate.

DELIVERY: We are operating twenty-four hours a day, and new additions to our mills and equipment are constantly increasing our present large output. To firms in urgent need of High Speed Steel, we suggest that a list of the required sizes and quantity be sent us, and we will promptly advise delivery possibilities.

MATERIALS: Realizing that contracts for tungsten ore from foreign lands were becoming more and more liable to non-fulfillment, we recently acquired additional valuable tungsten ore property in Boulder County, Colorado. The purchase of these mines, rich in tungsten, assures us of a sufficient quantity of this scarce ore for fulfillment of all orders we will accept.

GRADES: When you see the mark "Red Cut Cobalt" or "Red Cut Superior" on a bar of high speed steel, your mind will automatically connect the words with exceptional quality and uniformity. A man is known by the company he keeps, and high speed steel is known by the quality and quantity of valuable elements it contains, such as tungsten, vanadium, etc. The phenomenal success of the Vanadium-Alloys Steel Company, and the enviable position it occupies to-day in the hearts of the trade, was not obtained by legerdemain, but by strictly adhering to the principle of quality and service.

VANADIUM-ALLOYS STEEL COMPANY
PITTSBURGH, PA.

WHY P.&W. TAPS WIN

It's in the Design

One-third of the land from the cutting edge is concentric.

The remaining two-thirds has eccentric relief.

The taper-tap has a cylindrical pilot.

The taper and plug-taps have an eccentrically-relieved chamfer relieved clear from the cutting edge. The highest grade of steel obtainable is used.

What it Means to You

Taps can be sharpened at the only correct point—on the face of the cutting edge.

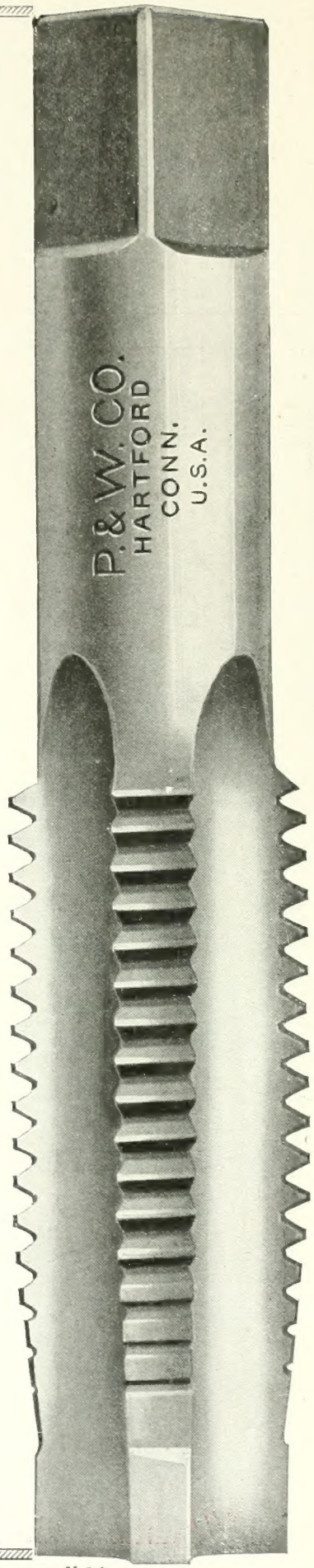
Sharpening in no way affects their size.

Can be sharpened long after other so-called eccentrically relieved taps are rendered useless.

We obtain the freest cutting tap with the longest life—an exclusive combination.

Accuracy nowhere else obtainable is secured together with a degree of finish and refinement heretofore thought impossible with a commercial tool.

For a number of years we have made taps with this style of relief. They have won out steadily and consistently on merit alone.



The Tap with the

(Trade-Mark)

Con-eccentric Land

(Registered U. S. Patent Office)

Pratt & Whitney Company of Canada Limited

DUNDAS	MONTREAL	WINNIPEG	VANCOUVER
Ontario	723 Drummond Bldg.	Bank of Hamilton Bldg.	B.C. Equipment Co.

The advertiser would like to know where you saw his advertisement—tell him.

Lathes and Attachments

for the manufacture of

6", 8" and 9.2

HIGH EXPLOSIVE SHELLS

This Equipment is all New, Modern and Heavy

Write or wire our nearest office for particulars

EARLY DELIVERY

The John Bertram & Sons Co. Limited

DUNDAS, ONTARIO, CANADA

MONTREAL
723 Drummond Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

By B.G.N.

"The Passing of Narrow Gauge"

IN the Saturday Evening Post last week there appeared an article entitled "The Passing of Narrow Gauge."

If your optimism needs a bracer, read this article. It would encourage the rankest and most confirmed pessimist. Let us quote:

> "The broad-gauge man was speaking of the fall in exchange between pounds and dollars. Some big wheat contracts had been cancelled to save exchange. Canada had placed her forty-million dollar loan in New York instead of London, and by so doing had saved over a million in exchange.
>
> " 'Do you care to give any views as to how exchange will be righted?' I asked. He did not care to have his name given, but here is what he said:
>
> " 'England will restore exchange by shipping goods to the United States, and we'll borrow it back from them.'
>
> "Do you appreciate just what that answer meant? Canada is to-day the king-pin of the triangle between London and New York banks. London cannot afford to have gold go permanently out of the Empire. New York cannot afford to have half a billion of gold lying idle in her vaults. Canada will need to borrow, and she will be unable to borrow in England. The present financial movement from London to New York, from New York to Canada, is one of the most significant things that have happened since Confederation. Canada must play the financial game henceforth with Uncle Sam and John Bull as her partners, and she holds the pivotal place in the game. Will she be broad-minded enough to play it? Yes, for the narrow-gauge man will pass off the boards.
>
> "For a hundred years Canada and the United States have existed side by side without a fortress. For the next hundred years they will exist side by side, bound together by gold strands. The boom brought an investment of easily a billion dollars of American capital to Canada."

What is required now is active preparation for the future. The munition makers' insistent call for equipment will eventually subside and then the industries of peace will clamor in their stead.

Now is the time to cultivate the business which is surely coming. Your harvest will depend entirely upon how well you till the soil.

Advertising does not perform miracles over night, but it is the master salesman in the commercial world to-day. Why not back up your estimate of the future by commencing to advertise at once?

CANADIAN MACHINERY

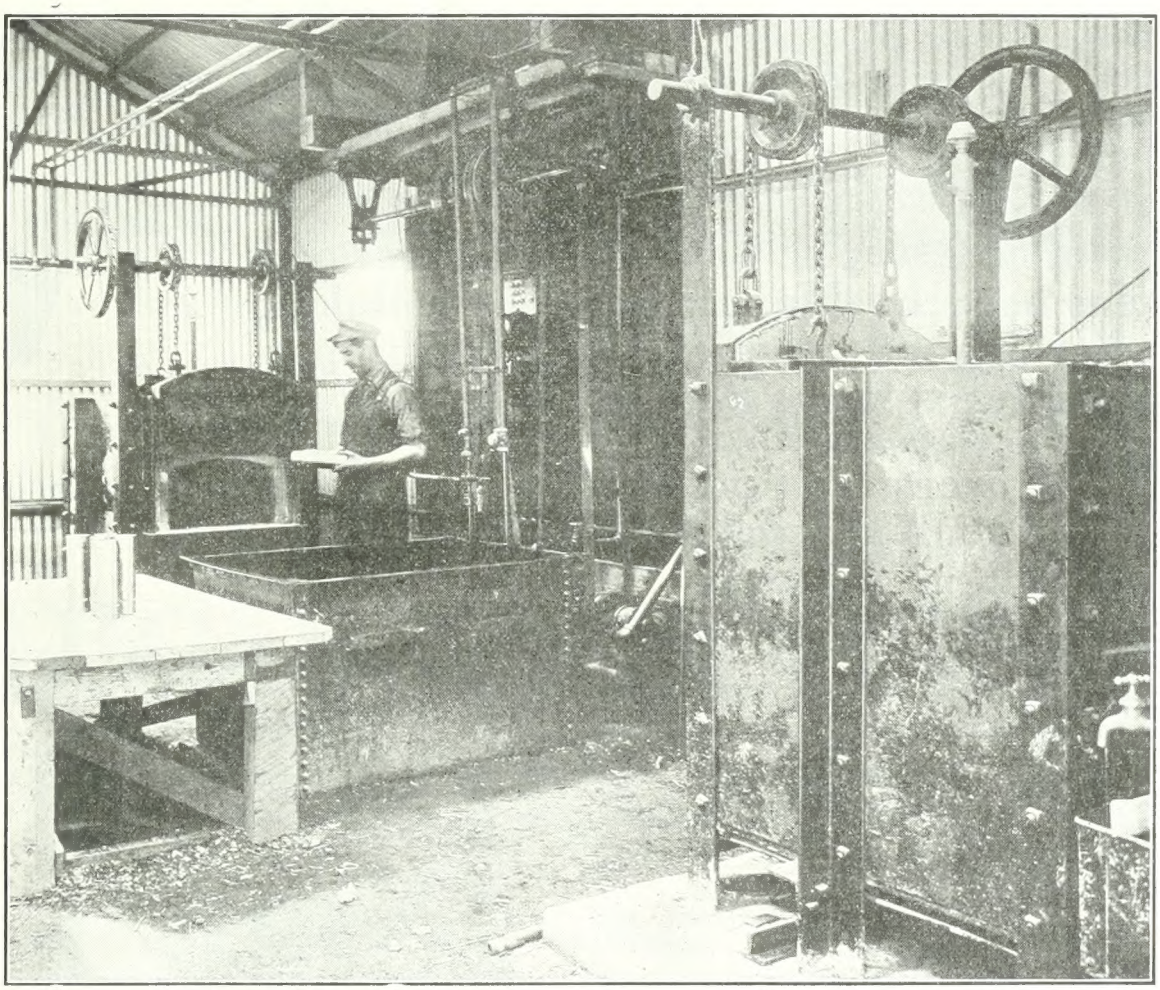
143-153 University Ave. TORONTO

HEAT-TREATING FURNACES FOR

SHELL WORK

"MECOL" FURNACES especially designed for this work are giving entire satisfaction with OIL, GAS, and other fuel

DESIGNED AND BUILT IN CANADA



Mechanical Engineering Furnaces installed in plant of A. B. See Elevator Co., Montreal

¶ Shell, Howitzers and Cartridge Cases must be accurately HEAT TREATED for successful manufacture.

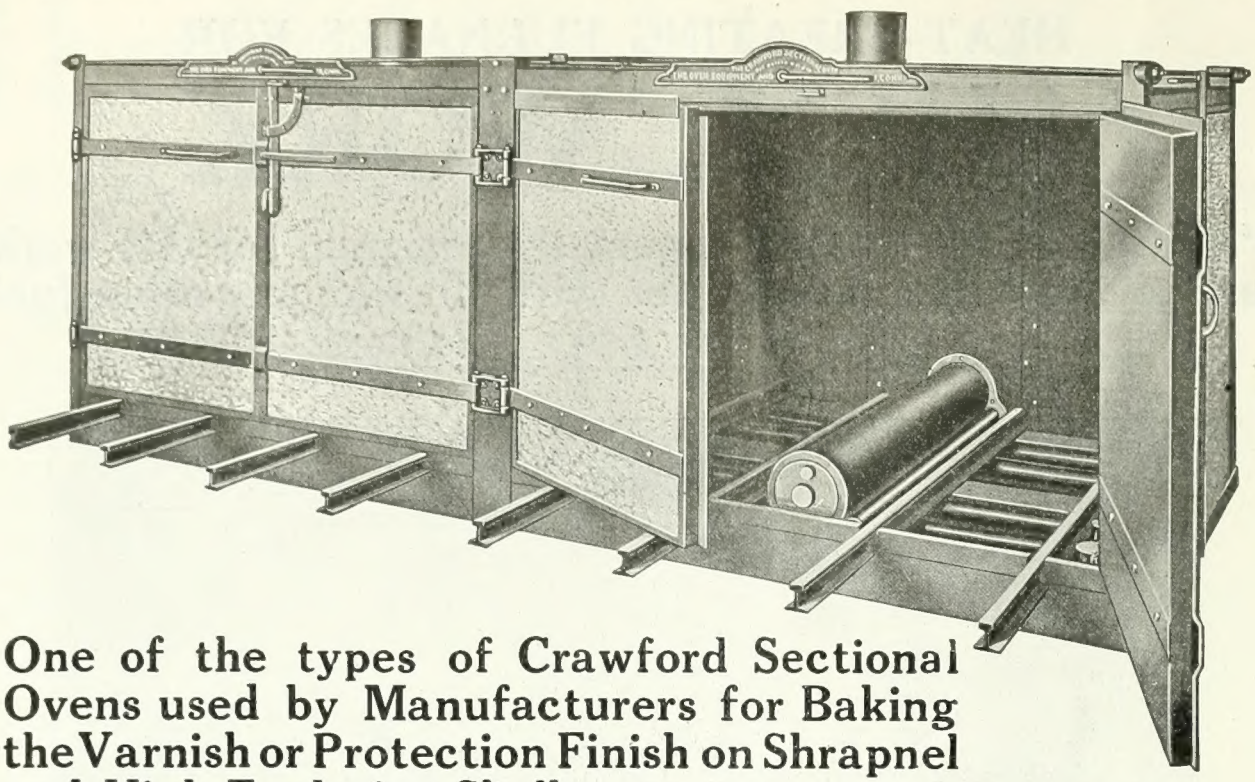
¶ See our Special Continuous Furnace for annealing Brass Cartridge Cases before buying your equipment.

¶ Largest manufacturers have them in use. Full particulars on request.

All Furnaces designed and built under personal supervision of F. DITCHFIELD, "THE FURNACE MAN."

Mechanical Engineering Company, Limited

55 COTE STREET, MONTREAL, QUE. PHONE—MAIN 3585

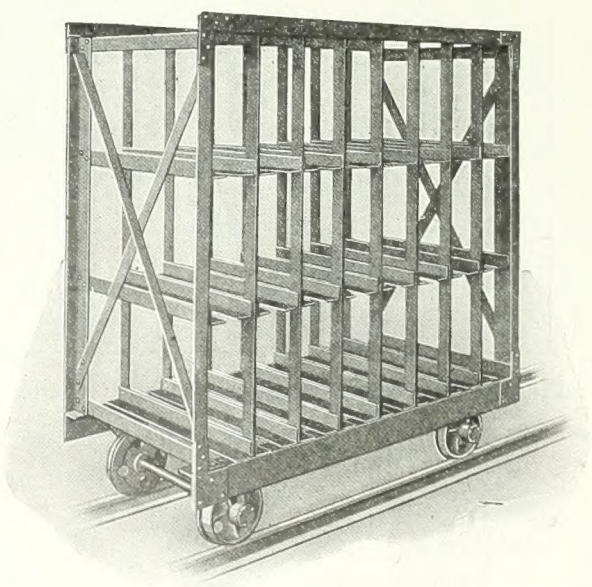


One of the types of Crawford Sectional Ovens used by Manufacturers for Baking the Varnish or Protection Finish on Shrapnel and High Explosive Shells.

These ovens are equipped with the only gas burner that gives a combined radiated heat and circulation of pre-heated air in the oven.

The gas and air are mixed and combustion in the large cylinder supported by air from a positive pressure blower which gives the highest efficiency and economy known for burning either city, natural, gasoline or producer gas, and there is no exposed flame in the oven.

The truck shown holds (120) twenty-eight-pound shells and is planned to stand the shells on end, resting on angles. Other designs have been built for shells ranging in weight from fifteen to eight hundred pounds, the last mentioned shell being forty-eight inches high by twelve inches in diameter.

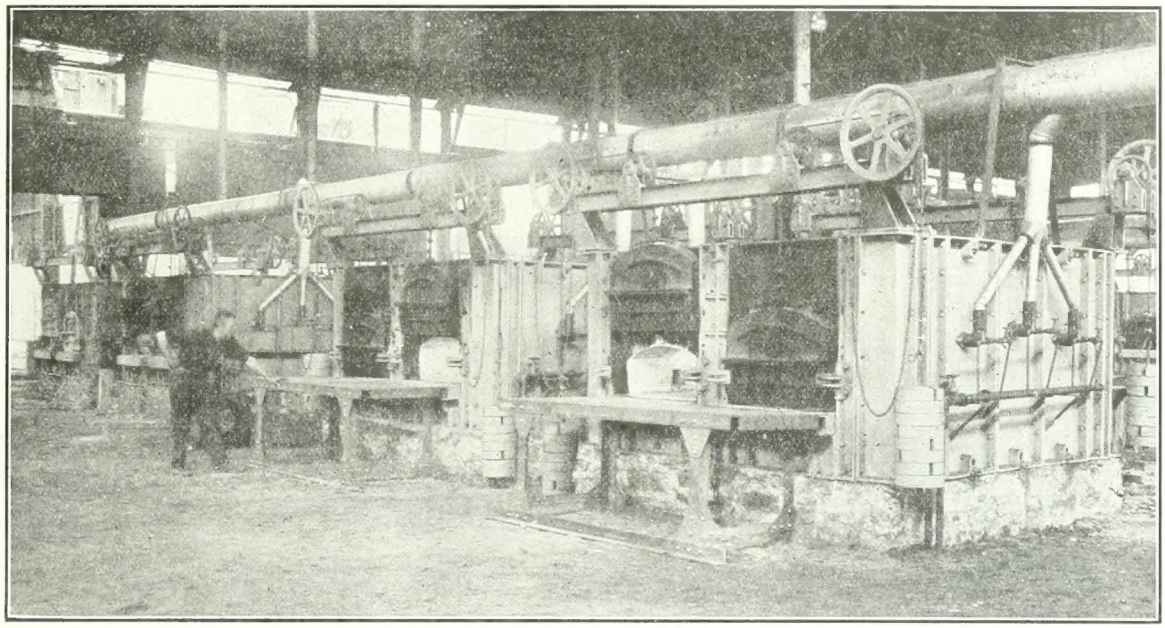


The Oven Equipment & Manufacturing Company

NEW HAVEN, CONN., U.S.A.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY CO., LIMITED, TORONTO, CANADA

The advertiser would like to know where you saw his advertisement—tell him.



TATE-JONES FORGING FURNACES, PENN'A STEEL CO., STEELTON, PA.

FORGING FURNACES

FOR

HIGH EXPLOSIVE SHELLS

"Tate-Jones" Forging Furnaces for High Explosive Shell Work are properly designed and constructed to give maximum output per unit of fuel burned and per square foot of floor space occupied.

Properly heated billets mean for you more rapid production and fewer rejections.

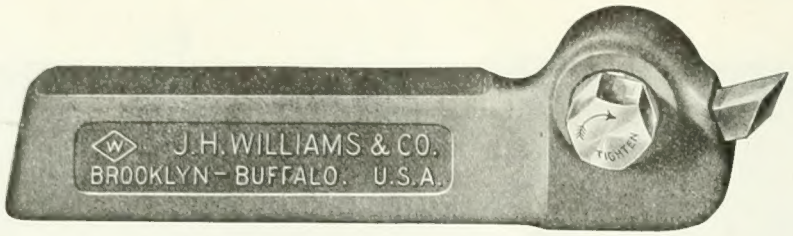
Write us about the size and number of shells you desire to handle for information in regard to "Tate-Jones" Forging Furnaces.

Ask for Bulletin "Shells and Shell Furnaces"

TATE-JONES & CO., Inc., PITTSBURGH, PA.

FURNACE ENGINEERS

Ontario Agents: Rudel-Belnap Machinery Company, Toronto



MANUFACTURERS OF SUPERIOR DROP-FORGINGS

Williams' "Agrippa" Tool Holders

"THE HOLDERS THAT HOLD"

Utilize, protect and conserve high speed steel.

At two dollars per pound how much per cutting edge do you care to waste, support in idleness or scrap?

Have you considered

1. That no efficient cutter is consumed while at work?
2. That all lathe tools consumed are wasted in sharpening?
3. That you ultimately waste all the high speed steel you buy?
4. That the less you reduce to produce a sharp edge the less you waste?
5. That the working edge alone pays dividends and wages?
6. That the working edge has little weight?
7. That the bar section bought should be determined by the working end rather than the idle end of the tool?
8. That the idle volume of forged tools might better be made of a more suitable steel that costs less?
9. That maximum tool economy demands that the greatest number of perfect cutting edges be obtained per dollar expended?
10. That a single forged tool will only operate (between sharpenings) in one machine but if converted into small cutters and used in "AGRIPPA" Tool Holders it will keep a dozen machines humming constantly and provide spare cutters besides?
11. That as machines in use are capable of no greater performance than modern tool holders afford solid forged tools are extravagant?
12. That reshaping of tool holder cutters is but a moment's grinding work, while reforming a solid tool takes hours?
13. That very soon high speed steel may be unobtainable?
14. That if you convert your solid forged tools into tool holder cutters at a trifling expense for reduction you make yourself independent of the advancing market?

ANALYZE—ANSWER—ACT

J.H.WILLIAMS & CO.
45 Richards Street BROOKLYN, N.Y. CITY
The Wrench People

Western Office and Warehouse: 40 So. Clinton Street, Chicago, Ill.

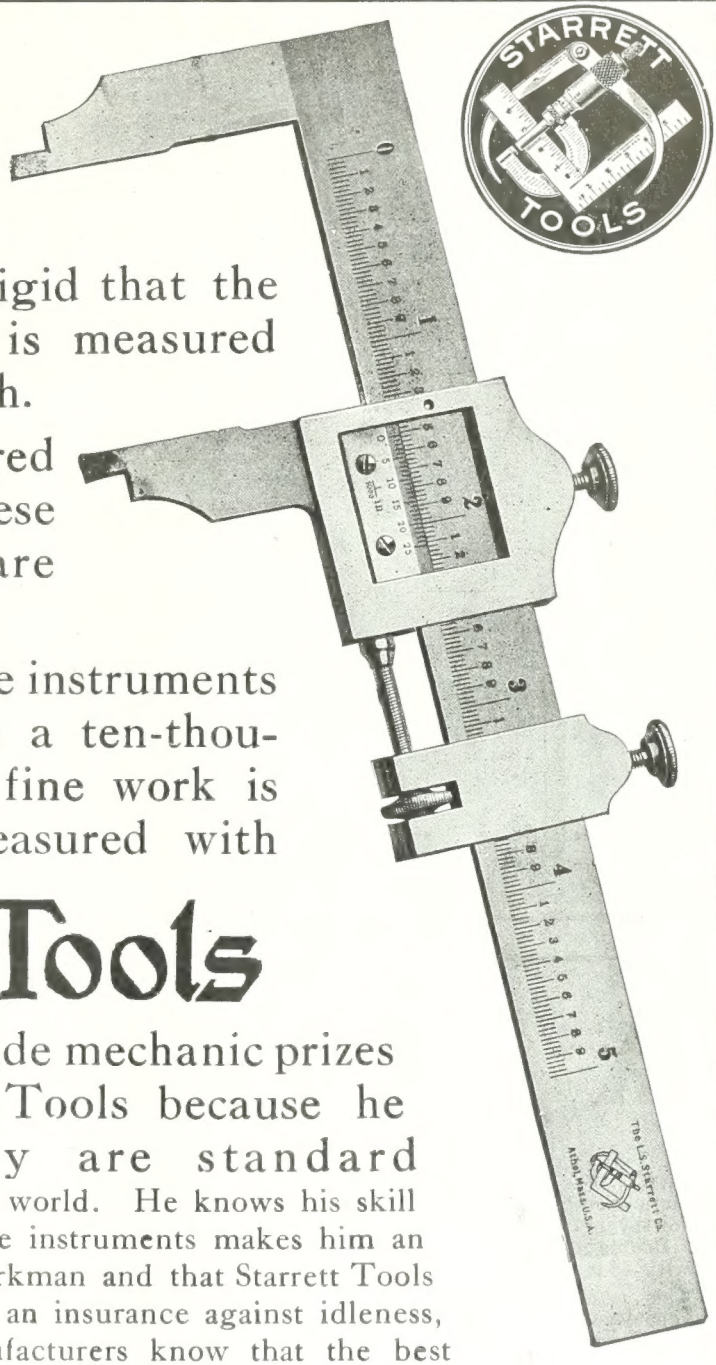
Catalogue sent upon request.

Accuracy

INSPECTION in modern factories has become so rigid that the accuracy of workmanship is measured to the thousandth of an inch.

Think of the accuracy required in the factory where these measuring instruments are made.

In the Starrett factory, where instruments are made that measure to a ten-thousandth of an inch, all the fine work is laid out—scribed and measured with



Starrett Tools

Every high-grade mechanic prizes his Starrett Tools because he knows they are standard throughout the world. He knows his skill aided by these instruments makes him an accurate workman and that Starrett Tools are almost an insurance against idleness, for manufacturers know that the best workmen use the best tools.

Starrett Tools include 2100 styles and sizes of fine instruments—steel rules, tapes, squares, levels, hack saws, calipers and dividers, micrometers, gages, speed indicators and many others.

Send for Free Catalog No. 20-3, prices, etc.

BY INVITATION MEMBER OF

NEW YORK, U.S.A.

THE L. S. STARRETT COMPANY

"The World's Greatest Tool Makers"

ATHOL, MASS.

New York London Chicago

If what you want is not advertised in th is issue consult the Buyers' Directory at the back.

THE BANNER OF MERIT

HONOR AWARDED MEANS MERIT REWARDED

Showing the Official Award Ribbon of the Medal of Honor awarded TRIMO

TOOLS at the PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

SEND FOR CATALOGUE No. 200.

TRIMONT MFG. CO., ROXBURY, MASS.

A MODERN SAVER

of Time, Money, Space and Labor

Here is a machine that is well worthy of your attention — our "**Double C Punch and Shear**" with 48-inch throat.

This machine has an enormous capacity for doing **rapid, accurate** and **economical** work of **quality.**

Let us send full description. If you are interested in up-to-date money-saving machinery you cannot afford to remain uninformed.

We manufacture a complete line of

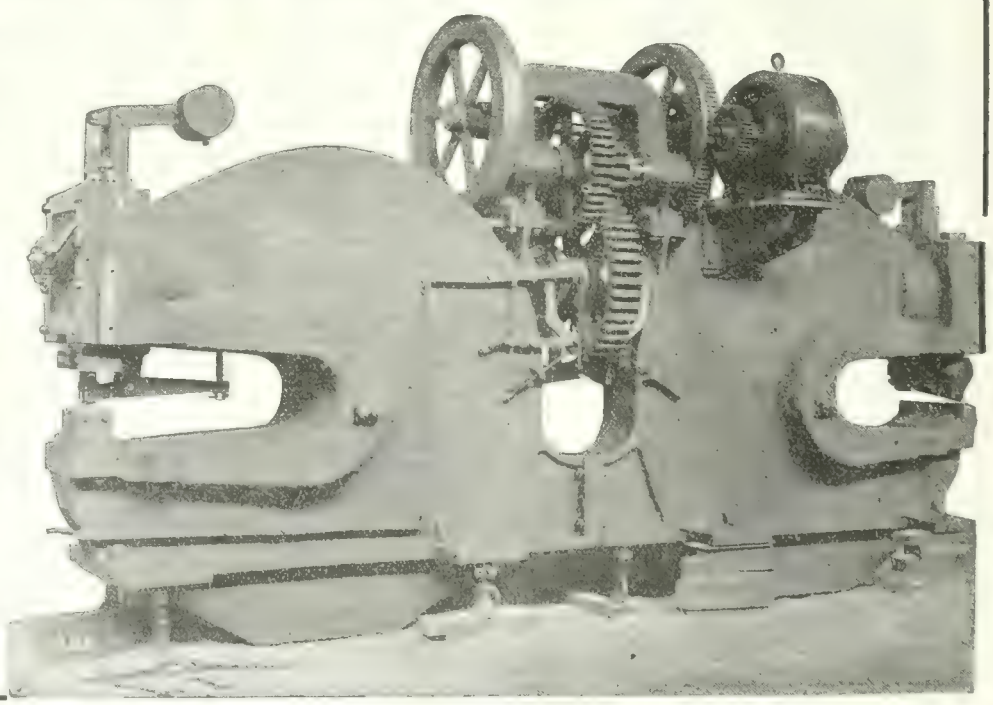
LABOR-SAVING MACHINERY

all kinds and sizes, for

Structural Iron Works, Railroad and Locomotive Shops, Boiler Shops, Rolling Mills, Agricultural Implement and Plow Shops, etc

The Long & Allstatter Co.
HAMILTON, OHIO

Canadian Representatives
RUDEL-BELNAP CO.
Montreal, P.Q. Toronto, Ont.



KEMPSMITH

MILLING MACHINES

Embody the following three distinctive features of construction, which make them unusually rigid and convenient in operation:

Keyed Overhanging Arm

This patented feature provides for positive alignment of arbor and boring bar, and prevents the cutter being pounded out of line under cut.

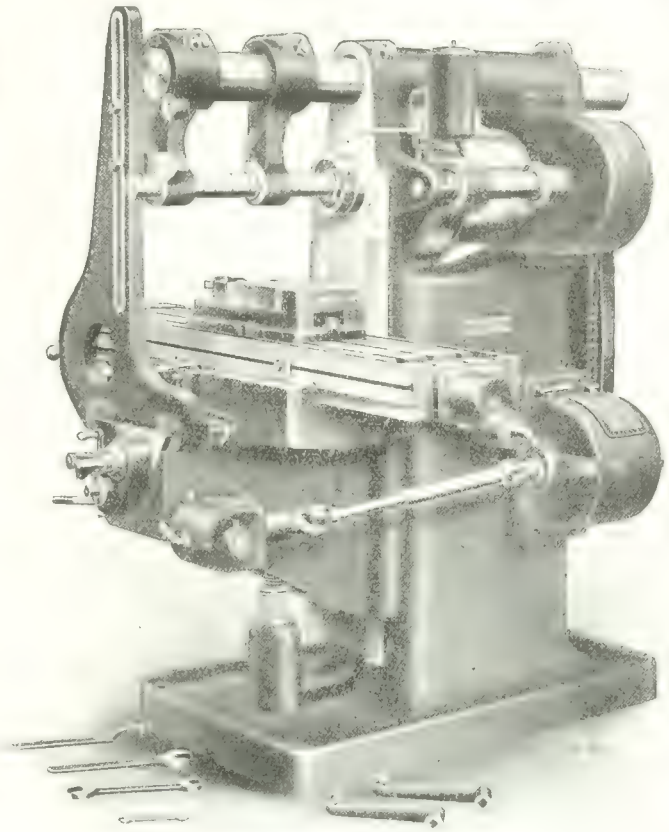
Keyed Spindle Nose

Our patented spindle nose is slotted for positive drive of arbor, and also permits the use of either right hand or left hand face milling cutters.

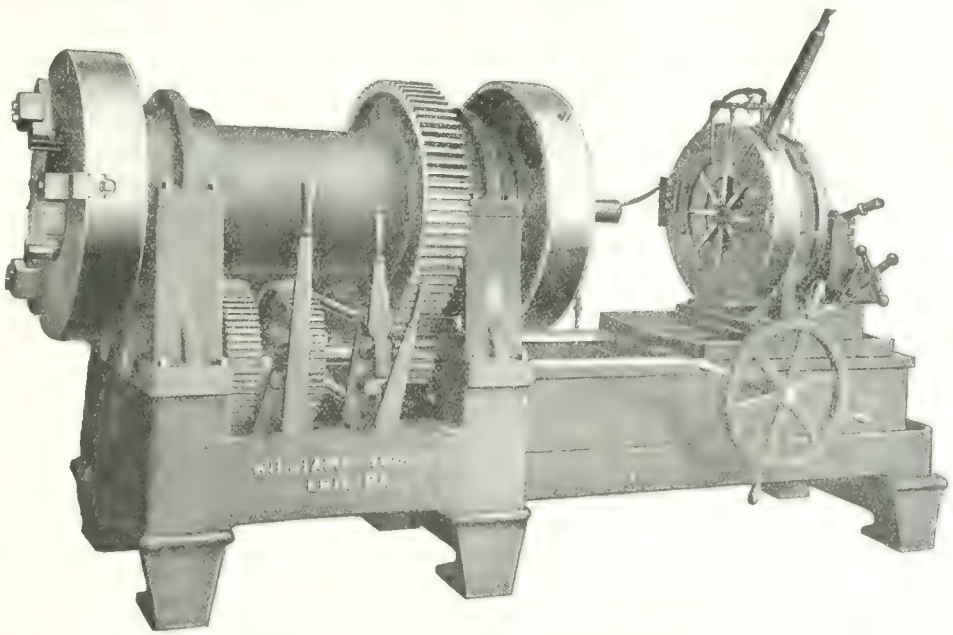
Reversible Outboard Support

Outboard support is a rigid one-piece casting, reversible according to direction of cut. It leaves ample room for the operator to handle his work

Catalog explaining this and other features gladly sent on request.



KEMPSMITH MFG. COMPANY
MILWAUKEE, WIS.



The gas light was a big improvement over the tallow dip, but it had to give way to the electric light; and the Tungsten has superseded the little glimmer that once delighted us.

If you are still employing pipe-cutting methods as antiquated as the tallow dip, you need a Williams Pipe Machine, which occupies the same position in the pipe-cutting field as the Tungsten does in the lighting world, to bring you up-to-date.

Let us quote you prices and terms: any machine to cut 10 sizes of pipe between 1-4 inch and 18 inch, with any kind of power.

Anyone making, selling or buying a pipe machine, claimed to be a Canadian-made Williams Pipe Machine, does so without right or authority from us, and is liable to prosecution for damages.

Williams Tool Co., Erie, Pa., U.S.A.

AGENTS:

A. R. WILLIAMS MACHINERY COMPANY

ST. JOHN, N.B. TORONTO WINNIPEG VANCOUVER

Our Newly Designed

Shrapnel Shell Cleaning Machine

Cleans all *Standard* Sizes and accommodates various *other* sizes

The table of this machine has six shell pockets. Three of these are in the Blasting Department, and the other three, as shown in the illustration, are in the open. Thus, while three of the shells are being cleaned, the operator can remove the other three that have been cleaned, replacing them with three more to be blasted.

Consequently the machine can be kept in constant operation.

This machine, if connected to any exhaust system, will be nearly dustless and absolutely automatic in operation.

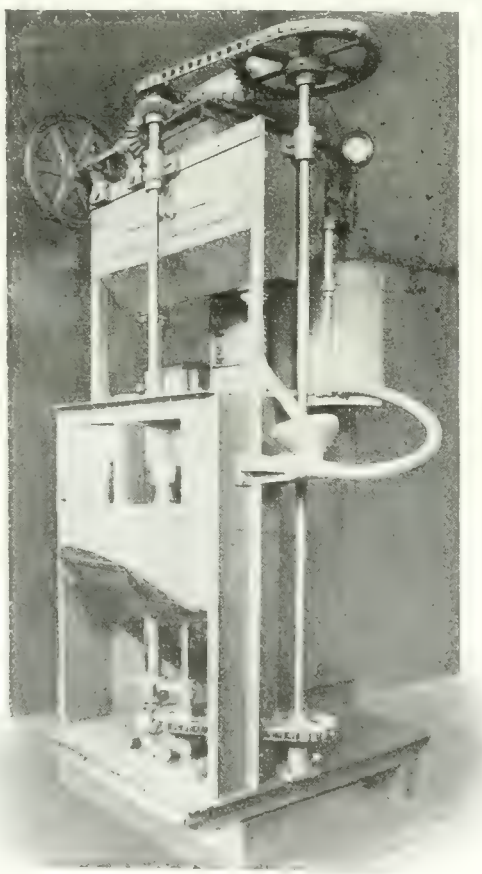
On the sand blasting table proper the division plates are lined with wood. This protects the steel plate. The wood is inexpensive and easily replaced.

The machine is so designed that the copper band groove is blasted on the exterior of the shell and another nozzle blasts the upper part of the exterior of the shell.

Its capacity for continuous running is from 150 to 200 shells per hour.

We are anxious to tell you all about it.

Write us.



We are manufacturers of Sand Blast equipment for any particular need. Also cleaning mills, dust arresters, cinder mills, resin grinders and other foundry equipment.

The W. W. SLY MANUFACTURING COMPANY

CLEVELAND OHIO

Why go to the expense of buying new machines for the manufacture of

SHELLS?

We have already shipped some 75 carloads of

Rebuilt Machine Tools

to CANADA since the outbreak of the war, with absolute satisfaction in each case.

If you need any equipment it will be to your advantage to get in touch with us as our facilities for furnishing rebuilt machinery are second to none on the continent.

EVERY MACHINE WE BUY IS PUT THROUGH OUR OWN SHOPS AND COMES OUT IN ABSOLUTELY PERFECT ORDER—AND WE STAND BEHIND EVERY ONE WE SELL.

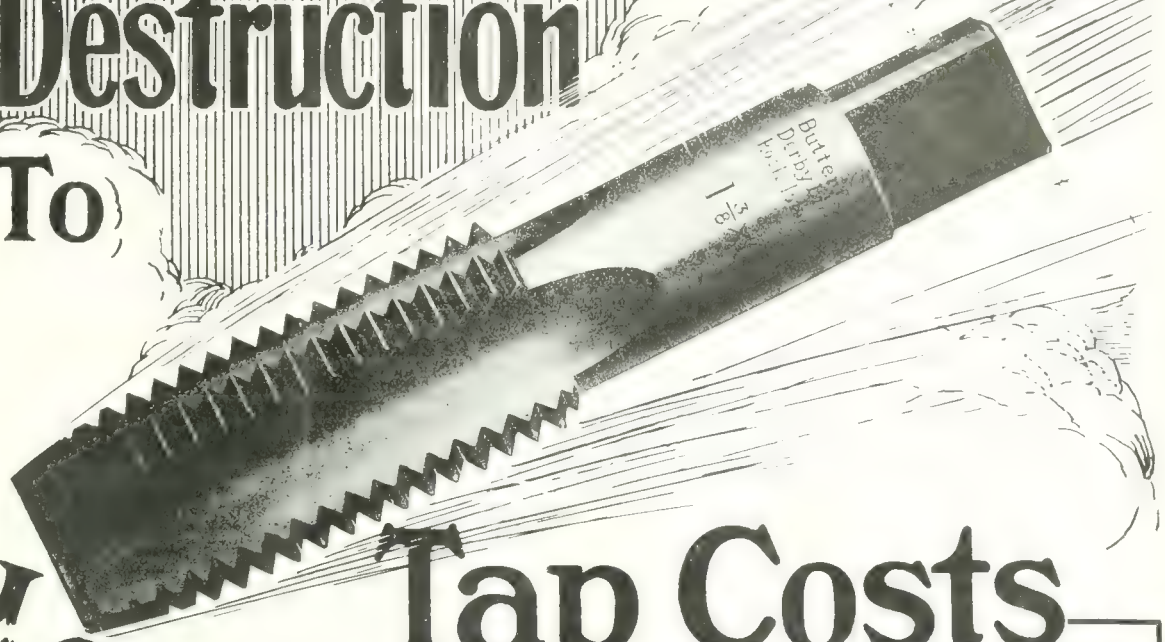
The demand is enormous, but we are not taking advantage of the war by putting on exorbitant prices—our aim is a good, square deal to everybody all the time. You can often get something practically equal to a new machine at a very great saving in price.

As we carry a large stock, we can likely supply you from stock, or if we cannot do this, we will take your order for future delivery, specifying a definite time when we will supply you with such tools as you may require.

New York Machinery Exchange

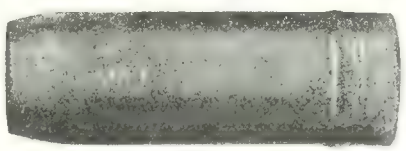
50 Church St., New York

Sure Destruction To BIG Tap Costs



Butterfield Taps

are the cheapest in the end because they produce more work in a given time and last longer—and what they do is accurate.

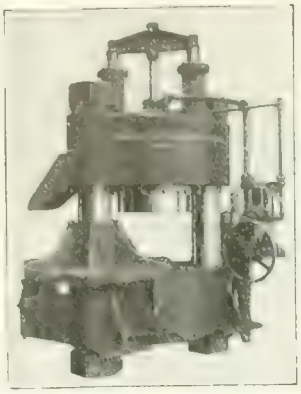


Butterfield Taps have, by their great success on shells, demonstrated that NO JOB IS TOO TOUGH FOR THEIR QUICK DISPOSAL.

What we claim we stand ready to prove.
Send a trial order. We guarantee satisfaction.

Butterfield & Company, Inc.

ROCK ISLAND, QUEBEC



ELMES HYDRAULIC PRESSES

Rapid-acting hydraulic drawing presses, piercing presses, pumps, and accumulators for making Shells, etc. High pressure fittings and valves, quick shipment.

Send for our illustrated catalog to-day

Charles F. Elmes Engineering Works

1217 N. Morgan Street, Chicago, U.S.A.

Over 50 years' experience building hydraulic machinery.

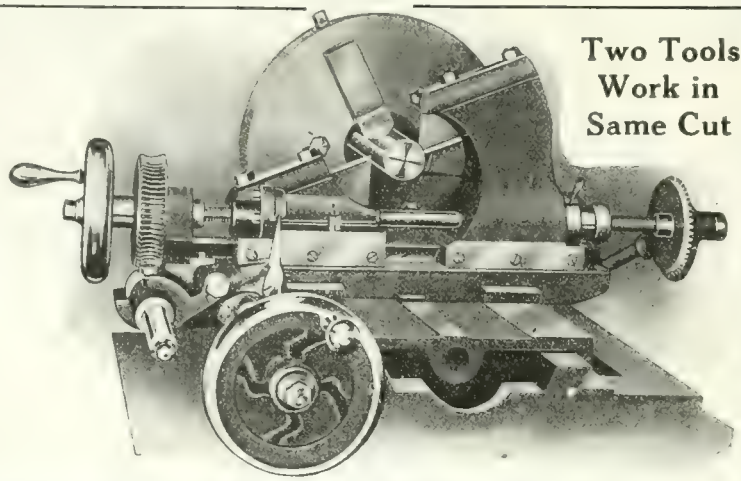
Double-Quick Cutting-Off

THE HURLBUT-ROGERS CUTTING-OFF AND CENTERING MACHINE has the advantage of two cutting tools.

Each tool is rigidly supported in a stationary block at an angle which permits a strong shearing cut.

WITH THIS MACHINE PRODUCTION CAN BE NEARLY DOUBLED, and the utmost accuracy maintained under the hardest of work.

Read full details. Write for catalogue.

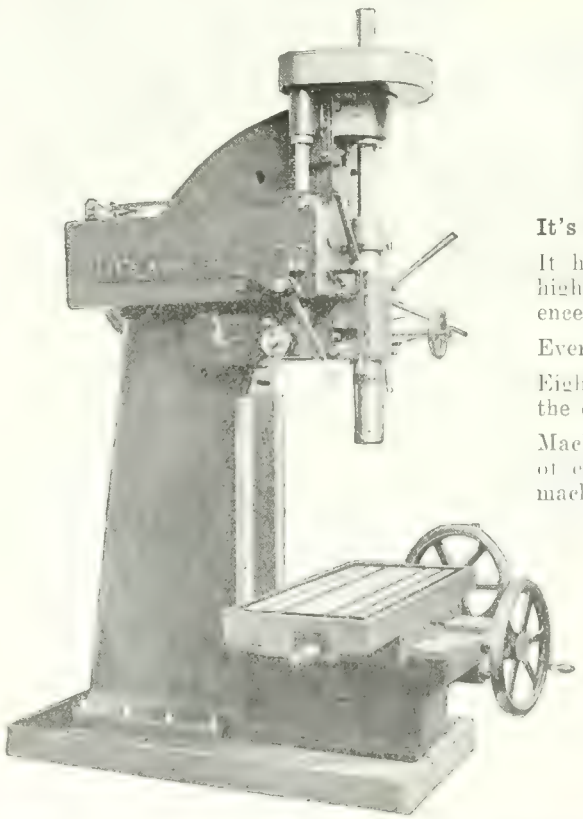


Two Tools Work in Same Cut

Hurlbut-Rogers Machinery Company

South Sudbury, Mass., U. S. A.

FOREIGN AGENTS—England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow, Newcastle-on-Tyne. H. W. Petrie, Toronto, Canada.



IT'S A BAKER

Drilling Shells

It's just the tool for the job, too.

It has the rigidity, accuracy, power and reliability that are highly essential to shell making—it has the speed and convenience that means a maximum production at low labor cost.

Every recent improvement is embodied in its design.

Eight speed and twelve feed changes within easy control of the operator.

Machine shown will drive 5-inch high-speed drills to their limit of efficiency in steel. We also build $2\frac{1}{2}$", 3" and 4" capacity machines.

Put your **drilling, boring, reaming, counter-boring, facing, under-cutting, box-milling and tapping problems up to a "Baker"**—it's a machine for big results.

Drop a line for full specifications.

BAKER BROTHERS

TOLEDO, OHIO, U.S.A.

Sales Agents: The A. R. Williams Machinery Company Limited, Toronto, Canada

The advertiser would like to know where you saw his advertisement—tell him.

Holden-Morgan Mechanical Plug Wrench

For screwing the base plugs into shells.

Output 120 per hour. One machine with an operator will do the work of four men. Friction device adjustable, and can be set for any required tension, and when set the pressure applied will not vary from the desired adjustment.

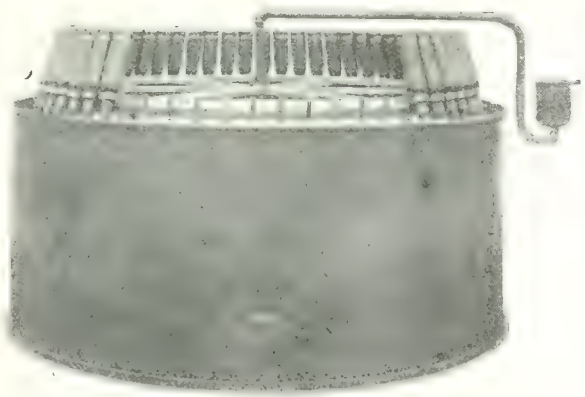
Direct driven, no countershaft needed. The plug is screwed in and tightened up entirely by mechanical action, and therefore eliminating the variations that result from hand work.

Can be made to handle any size shell, from 18 pr. up to 9.2" or larger.

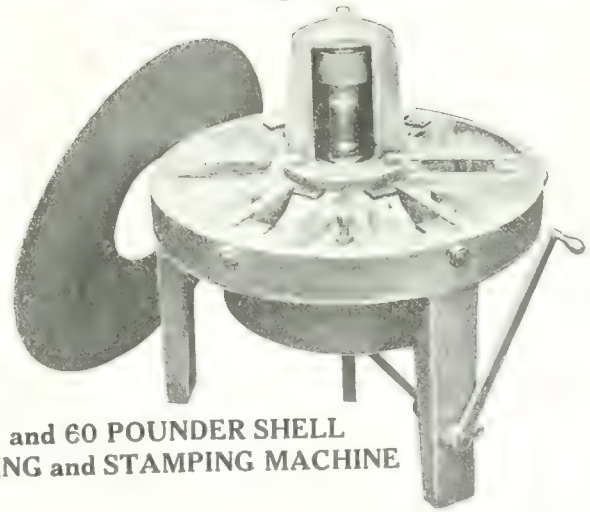
THE HOLDEN-MORGAN COMPANY, LIMITED

579 RICHMOND STREET WEST, TORONTO

Shell Painting, Nosing and Banding Machines



PAINTING MACHINE



4.5 and 60 POUNDER SHELL
BANDING and STAMPING MACHINE

SIMPLICITY: That is the beauty of these machines; they are so simple that a **woman or even a child can control them.** This is an important feature in reducing operating expenses.

Banding Press is sold without stamping attachment if desired.

Painting Machine is operated with an ordinary air drill, and, if desired, a heating coil under table, enclosed in a sheet steel shell, can be supplied, as shown in cut.

Canadian Locomotive Company, Limited, Kingston, Ont.

SALES HANDLED EXCLUSIVELY BY

The John Bertram & Sons Company, Limited, Dundas, Ontario, our agents for these machines

SaBeN ExTrA
HIGH SPEED STEEL

SABEN

The most economical and efficient steel for machining shells

Manufactured by Sanderson Bros. and Newbold, Limited, Sheffield, England

H·A·Drury Company
LIMITED
Montreal and Toronto

WOLFRAM

MADE IN THE U.S.A.

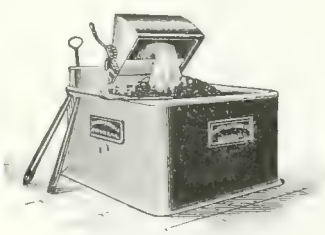
HIGH SPEED STEEL

TRADE MARK

Wolfram Cobalt High-Speed Steel, **BEST FOR TURNING SHRAPNEL.** Vulcan Hot Piercing Steel, **FOR ALL KINDS OF HOT WORK.** Vulcan Regal No. 2 Steel, **FOR BRASS FINISHINGS.** Vulcan Special "W" Steel, For Special Taps and Dies. Vulcan Non-Shrinkable Steel, For Intricate Dies. Vulcan Special Vanadium Steel Does Twice the Work of Regular Carbon Steels

VULCAN CRUCIBLE STEEL COMPANY
ALIQUIPPA, PA.

Do away with overhead piping and hoods



Cut out the repair bills—let in more light—increase the efficiency of your workmen—install

BUFFALO DOWN DRAFT FORGES

Our engineers will gladly give free advice on Forge Shop Layouts.

Write for Catalog 179-53, telling all about forges.

Canadian Blower and Forge Company, Limited
BERLIN, ONTARIO
ST. JOHN MONTREAL TORONTO WINNIPEG VANCOUVER

ARMSTRONG WHITWORTH OF CANADA
LIMITED

MANUFACTURERS OF CELEBRATED BRANDS OF

HIGH SPEED STEEL & DRILLS

"AW" FOR CUTTING ALL METALS AT HIGH SPEEDS

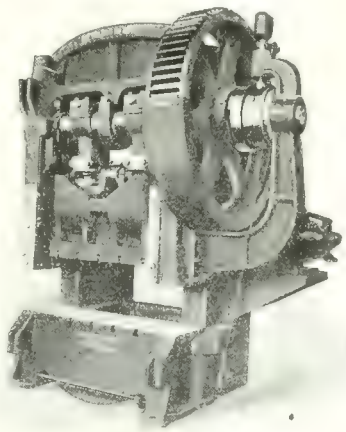
FOR HARD METALS — RAILWAY & TRAM TYRES "TYR"

OFFICE 22 VICTORIA SQ. MONTREAL — WORKS LONGUEUIL QUE.

All the Best Ideas and Skill of Experienced Engineers Embodied in this

"TOLEDO"

HIGH-SPEED FORGING PRESS



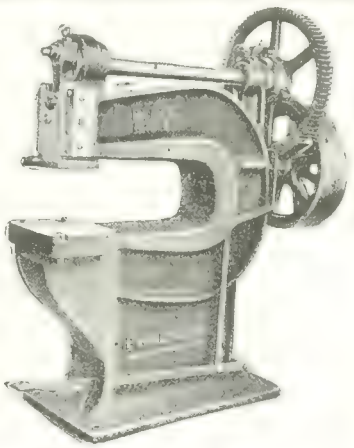
Strength assured by the intelligent use of best materials and the right proportions. Unusual length of gibs and liberal proportions of both slide and gibs permit concentrating the heaviest load at any point of down stroke.

Four, five or more forgings can be performed in succession without re-heating. Adapted to all classes of heavy forging, forming, stamping and embossing.

The Toledo Machine & Tool Co.

Toledo, Ohio

"Stiles" Deep Throat Punching Presses



BLISS

Especially adapted for steel range manufacture, automobile factories and sheet metal workers using large sheets of iron, steel, zinc, brass, etc. The deep throat permits of punching holes or openings in large sheets at a considerable distance from the edge, without interfering with the frame of the machine.

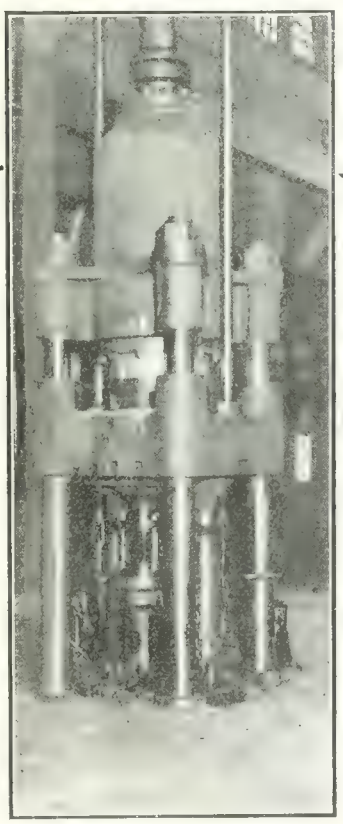
They may also be arranged with tie rods which makes them available for heavy punching near the edges of sheets in addition to the work mentioned above.

Let us send you descriptive matter covering your exact requirements. Write to-day.

Visit our exhibit at the Panama-Pacific International Exposition, Machinery Palace, Block 16.

E. W. BLISS CO., 20 ADAMS STREET BROOKLYN, N.Y., U.S.A.

Chicago Office: 122 West Washington Boulevard
Detroit Office: Dime Bank Building



PIERCING PRESS

Hydraulic Presses

for

Shell Manufacturing

We are making

HYDRAULIC PRESSES

for Piercing and Drawing

Shells and Projectiles

and are in a position to give

Prompt Delivery

The William Cramp & Sons Ship and Engine Building Company

PHILADELPHIA, PA.

SOUTHWARK

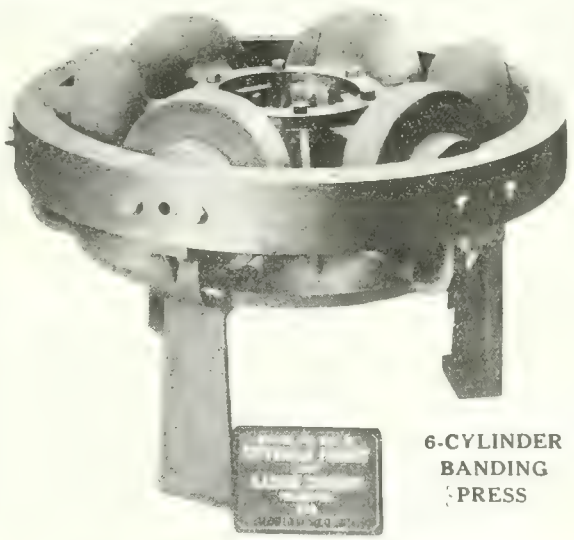
HYDRAULIC PRESSES AND ACCUMULATORS

POWDER BLOCKING PRESS

Banding Presses

Forging Presses

Nosing Presses



6-CYLINDER BANDING PRESS

HYDRAULIC ACCUMULATOR

Southwark Foundry & Machine Company

PHILADELPHIA

FOUNDED 1836

Old Colony Building, Chicago

Brown-Marx Building, Birmingham

The advertiser would like to know where you saw his advertisement—tell him.

SOUTHWARK

CUTTING-OFF MACHINES

HOW DO YOU CUT YOUR SLUGS? WHAT ARE YOUR COSTS?

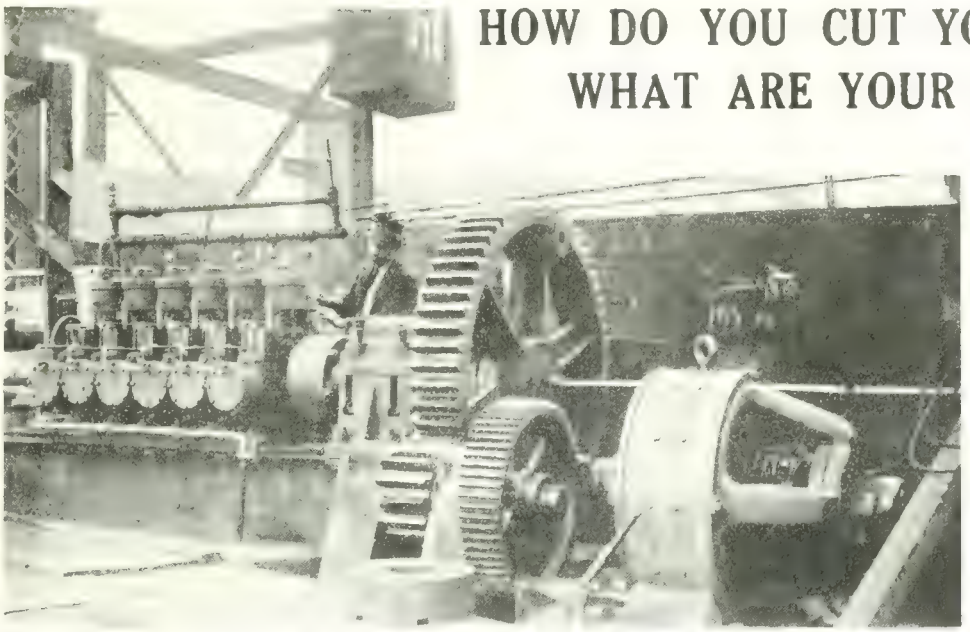


Illustration shows a powerful Air Operated Machine, for cutting off Cold Metal, 1" to 6" diameter. This machine cuts six slugs from a 5½" round in 65 seconds.

Minimum Operating and Maintenance Costs

No Waste

Maximum Production

The McMeans-Bosler Cutting Off Machine may be operated by one man, and handles a wide range of work with speed, accuracy and economy.

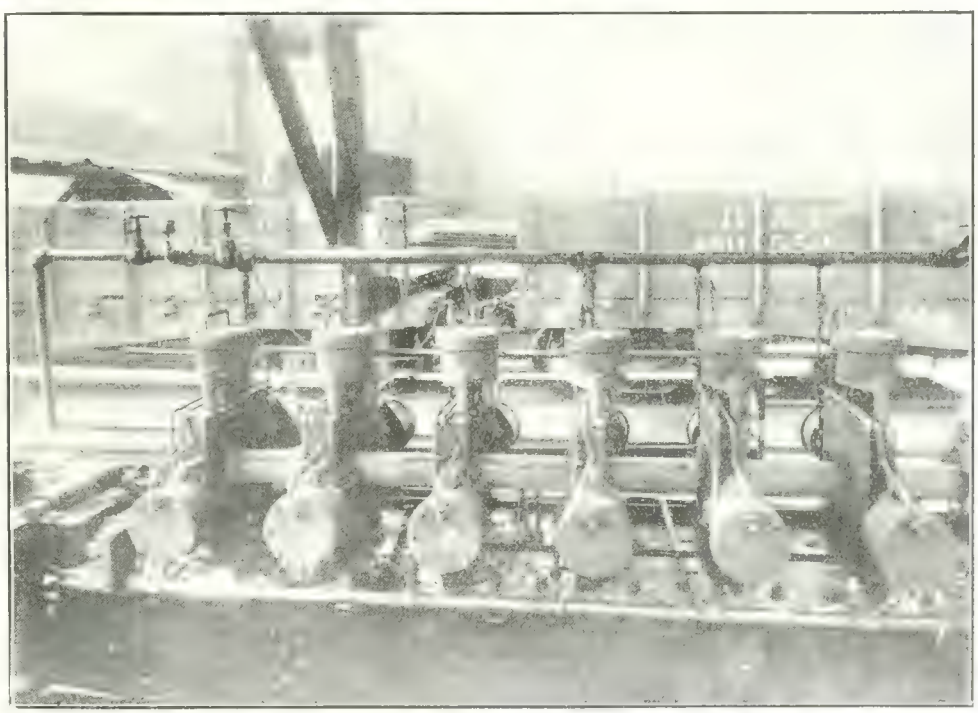
It costs LESS to Cut Stock on this machine. It will Cut your Cost as fast as it Cuts Steel.

It is built in single and multiple head types for cutting rounds from 1" to 13" in diameter. It can be equipped with handling device for disposing of the cuttings.

If you ROLL ROUNDS it is the ONLY way to keep ahead of your Mill. If you make SQUIT BLANKS it is the ONLY way to keep ahead of your Presses.

It leaves a BREAKING SECTION at the middle, as required by shell specifications.

Its Simplicity, Ease of Handling, Low Operating and Maintenance Costs, combined with its Great Speed and High Production, make it absolutely essential in plants of large output.



Same type of machine cutting rounds into slugs 19¾" long 5½" diameter

Southwark Foundry & Machine Company

PHILADELPHIA

FOUNDED 1836

Old Colony Building, Chicago — Brown-Marx Building, Birmingham

AMALGAMATED AMMUNITION - MACHINERY

Turns out the largest H.E. Shells with ease

Amalgamated Ammunition Machinery, being a complete line of special machines in two sizes, is capable of handling all roughing and finishing operations on all sizes of shells, from the smallest shrapnel to the largest H.E., with the utmost economy and speed. The machines are all designed for great strength, and are making most remarkable records, for rapidity and excellence of work, and actually "fool-proof" simplicity.

Attractively Quick Deliveries Guaranteed

In inquiring please facilitate prompt and satisfactory reply by giving all possible details of your requirements.

Amalgamated Machinery Corporation

72 West Adams Street, Chicago, U.S.A.

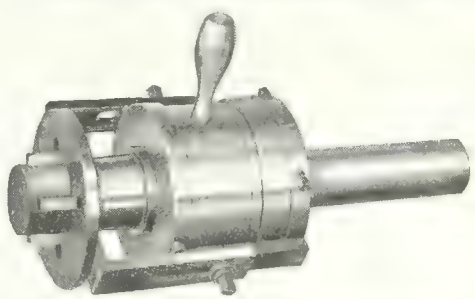
WHAT REASON HAVE YOU

For not using a Geometric Collapsing Tap in tapping out holes above 3¼-inch diameter?

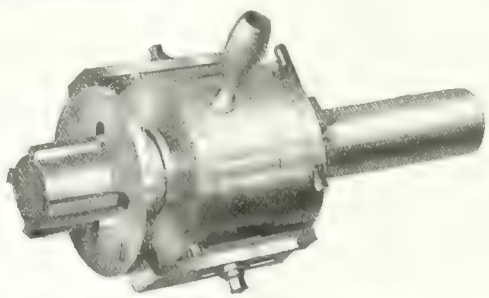
Your rate of production would be increased, and your cost of production decreased.

Geometric Collapsing Taps require no backing out over the threads. They are rigid while cutting, but collapse their chasers at the prescribed depth of thread.

It makes no difference what the thread is, a Geometric Collapsing Tap can be furnished that will produce it *to your entire satisfaction.*



Geometric Collapsing Tap Arranged for Ring Tapping



Geometric Collapsing Tap Arranged for Bottoming.

We will fit the tap with whatever size shank your machine requires. Send specifications of your work, and our experts will make a study of it and tell you what we can do for you.

Look over our catalogue. Get in touch with us, at least.

The Geometric Tool Company, New Haven, Conn., U.S.A.

CANADIAN AGENTS:

Williams & Wilson, Limited, Montreal. The A. R. Williams Machinery Co., Limited, Toronto, Winnipeg, St. John, N.B.

22 x 10 LATHES

Immediate Delivery

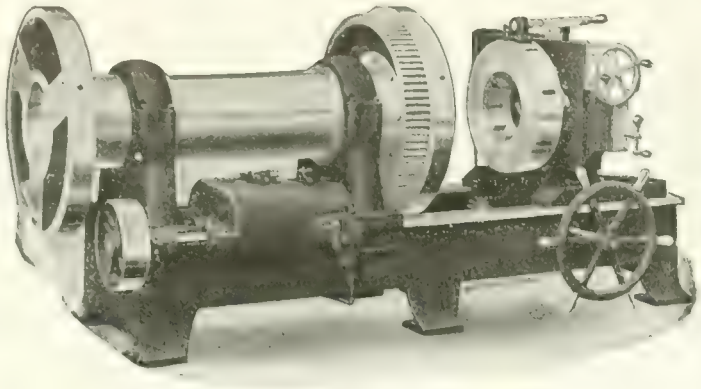
New Double Back Geared, Standard Make, Heavy Duty Lathes, weight 5500 lbs., quick change, 22 inch swing, 10 foot bed, in quantities for delivery.

December, January, February.

PRICES RIGHT.

Buffalo Tool and Supply Co.

40 HENRY ST., BUFFALO, N. Y.



SHOP REQUIREMENTS

are such that the most modern machinery is needed, built for long, hard service. We know those requirements and make our machines to stand the wear and tear which the service demands.

When deciding on a new machine it is well to consider what it will be worth in ten or fifteen years, and what it will cost to keep it in good running order during its natural life.

Endurance is only one of their good points.

Send For The Catalog

Bignall & Keeler Machine Works, **Edwardsville, Ill.**

The Canadian Fairbanks-Morse Co., Ltd.

Sales Agents for Canada

Montreal St. John Toronto Winnipeg Calgary Saskatoon Vancouver

Canada's Departmental House for Mechanical Goods

GRINDING STEEL CASTINGS

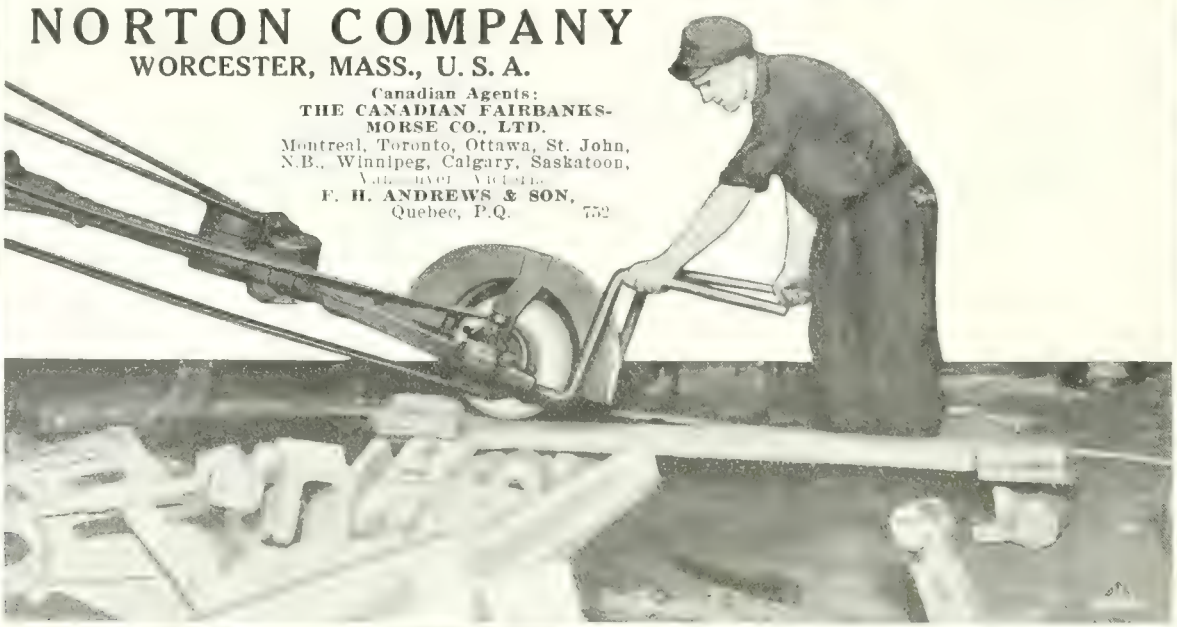
in a swing frame grinder furnishes the most severe test of the worth of a grinding wheel. It's in work of this sort that the superiority of Norton Alundum Wheels is most clearly demonstrated.

Properly selected Alundum Wheels keep clean and sharp—and produce a finish it is impossible to equal by any other means.

NORTON COMPANY

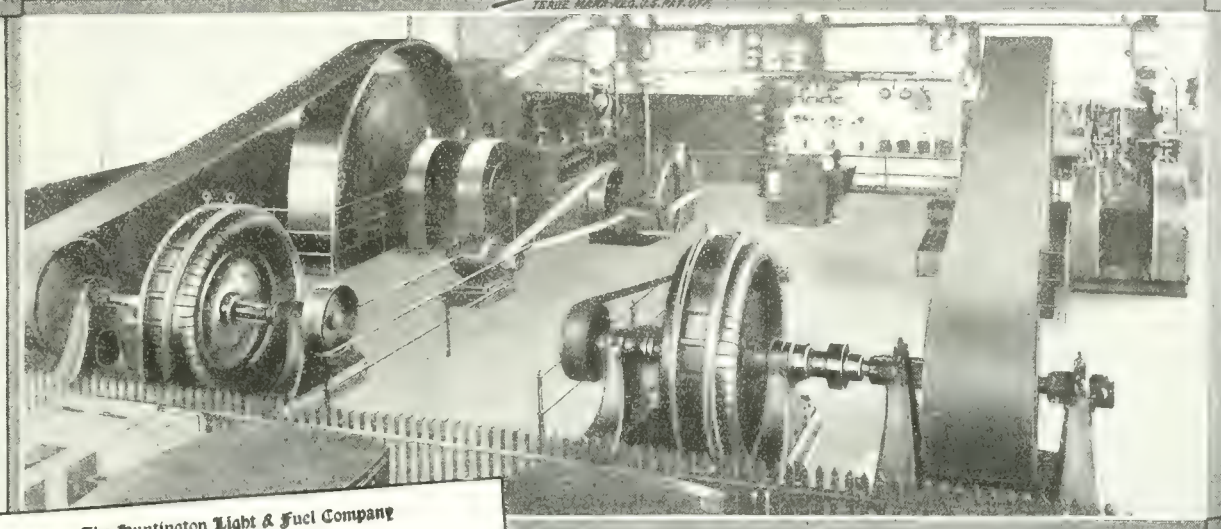
WORCESTER, MASS., U. S. A.

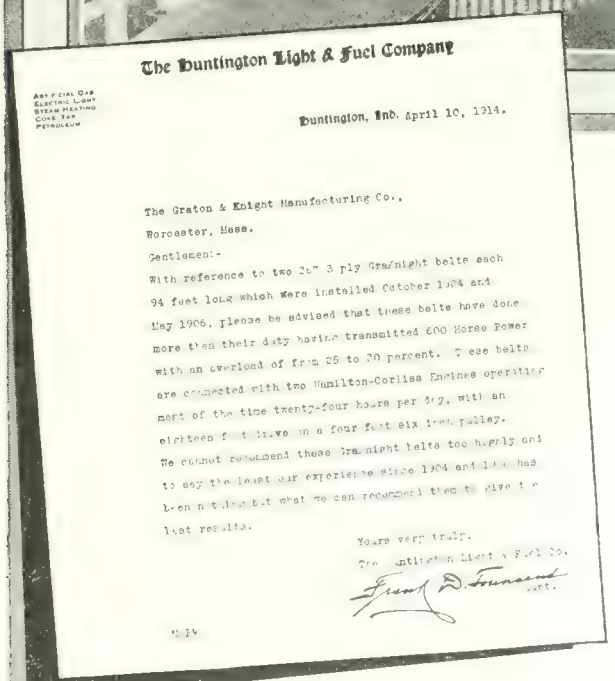
Canadian Agents:
THE CANADIAN FAIRBANKS-MORSE CO., LTD.
Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria.
F. H. ANDREWS & SON,
Quebec, P.Q.



1851 G & K

TRADE MARK REG. U.S. PAT. OFF.





The Huntington Light & Fuel Company

Artificial Gas
Electric Light
Steam Heating
Coke Tar
Petroleum

Huntington, Ind. April 10, 1914.

The Graton & Knight Manufacturing Co.,
Worcester, Mass.
Gentlemen:-
With reference to two 36" 3 ply Gra/night belts each 94 feet long which were installed October 1904 and May 1906. Please be advised that these belts have done more than their duty having transmitted 600 Horse Power with an overload of from 25 to 30 percent. These belts are connected with two Hamilton-Corliss Engines operating most of the time twenty-four hours per day, with an eighteen f[illegible] drive on a four feet six inch pulley. We cannot recommend these Gra/night belts too highly and to say the least our experience since 1904 and [illegible] has been a credit but what we can recommend them to give the best results.

Yours very truly,
The Huntington Light & Fuel Co.
Frank D. Fouracre
Supt.

ECONOMY IN POWER TRANSMISSION

Interests Every Manufacturer To-day as Never Before

The accompanying letter is evidence of the degree of economy being realized from the use of G & K Belting. The two 36" belts referred to are still in excellent condition, transmitting the same amount of horse-power and giving the same satisfactory service as heretofore.

There is a G & K belt for every drive and every condition of service and its use means "Economy In Power Transmission."

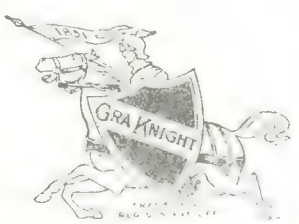
To assist you to determine the particular grade of G & K belting best adapted to your requirements, we maintain an extensive Engineering Department fully equipped to analyze any type of drive or any installation, and recommend the grade of belting from which you can derive the greatest economy.

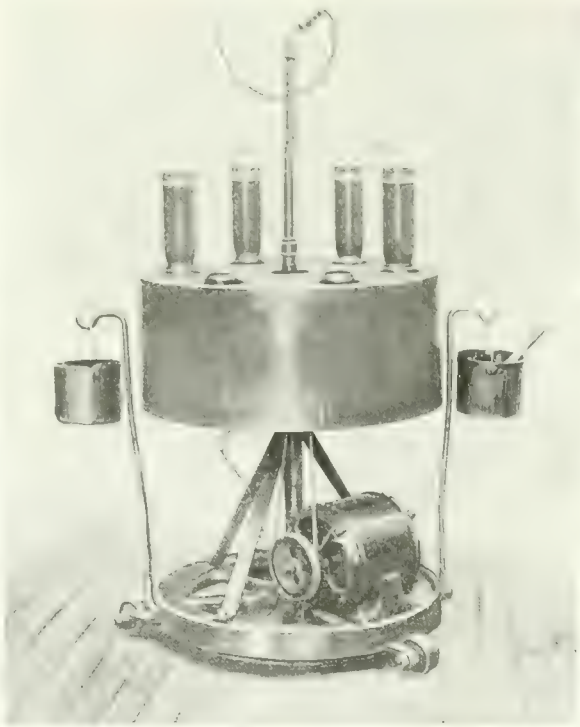
This service is gratis to all belting users. It will assist you toward greater "Economy In Power Transmission." May we serve you?

The Graton & Knight Mfg. Co.
OAK LEATHER TANNERS AND BELT MAKERS
Worcester, Mass., U.S.A.

Representatives in Canada:
THE CANADIAN FAIRBANKS MORSE COMPANY, Limited
St. John, Toronto, Quebec, Hamilton, Montreal, Ottawa, Vancouver, Victoria

"Consult our Engineering Department in connection with your Transmission Problems"





Shell Painting Machine

(Made in Canada)

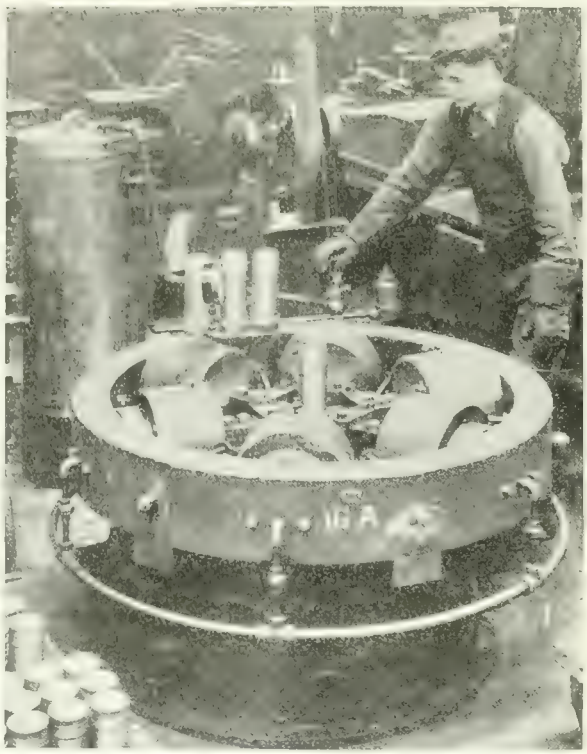
THIS machine consists of a portable revolving table operated by a motor at its base which receives its current through a lamp socket from the ceiling.

There are six vertical spindles built into the table and the shells are placed on these in an inverted position. These spindles rotate at about 250 R.P.M., and the painting is done with a flat pad from the paint receptacle conveniently attached to the machine. The time required for the painting is

Less than One Minute per Shell

i.e., for the three coats specified by the Government.

The Shells are then lifted from the spindles with a special holder which grips them at the copper band, and are placed in racks to dry.



Shell Banding Press

(Made in Canada)

THE machine illustrated above is a very powerful hydraulic press consisting of six pressure cylinders 9" in diameter and six plungers. The shell is placed in the centre and the plungers are brought up to the copper band and squeeze it under a pressure of 750 lbs. per square inch into its groove.

The entire control is by means of the small hand valve. Oil is used to transmit the pressure secured from a small high pressure power pump. A safety valve is provided to prevent accidents.

It is easy to operate and at the same time capable of being adapted to the banding of 18 *pr. Shrapnel, 4.5 and Russian Shrapnel and Lyddite Shells.* This machine can operate as fast as any mechanic can feed it.

Let us know what calibre of shell you are making and we shall be glad to quote you for a suitable press.

The Canadian Fairbanks-Morse Co., Limited

St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Winnipeg, Saskatoon, Calgary, Edmonton, Vancouver, Victoria

Canada's Representative House for Mechanical Goods

The advertiser would like to know where you saw his advertisement—tell him.

The Manufacture of Galvanized Sheets in Canada

Staff Article

Continual evidence of this country's industrial progress is afforded by the frequent establishment of factories for the manufacture of products, the demand for which has hitherto been supplied entirely by foreign producers. The demand for sheet metal in this country assures a market which is distinctly encouraging to the organizers of this enterprise.

A NEW industry for Canada was inaugurated on September 1 last when the Dominion Sheet Metal Co. started operations at their new galvanized sheet plant at Hamilton, Ont. The plant occupies a site covering five acres, and is situated on the belt line railway, jointly operated by the G. T. R., C. P. R. and the T. H. & B. It is within a short distance of Lake Ontario, the water of which being soft and clean, is particularly suitable for the process of galvanizing. If hard water only was obtainable, the effects of lime and other deposits, which prevent the sheets from receiving the coating properly would have to be neutralized.

In normal times approximately 70,000 tons of galvanized sheets are used in Canada per year, and prior to the establishment of this plant no sheets were produced in Canada, the bulk of the supply being imported from the United States and some from England. The product of this plant bears the trade mark of "Premier," but in addition the company makes a "tight-coated" "Premier" galvanized sheet when desired. This latter is especially useful for purposes requiring extreme forming, seaming, etc. The black sheets from which the "Premier" galvanized sheets are made are specified from certain mills, and must conform to exact physical and chemical analysis. All the materials used, such as open-hearth or Bessemer black sheets, spelter, lead, tin, sal-ammoniac and acids, etc., must conform to approved chemical analysis, subject to test.

Plant Layout

The factory comprises two bays, east and west, the former being 50 ft. x 200 ft., and the latter 60 ft. x 200 ft. A spur from the belt line railway runs into the east bay for its entire length; the loading and unloading of the cars is, therefore, done under cover. By this arrangement the handling of the sheets, both black and galvanized, is greatly facilitated. In this bay is installed a 124-in. squaring shear for trimming sheets, which was built by the Bertsch Co., Cambridge City, Ind. Provision has also been made for installing any additional machines that may be required in the future.

In the west bay the entire space, with the exception of a galvanized sheet store room at the north end, is occupied by the galvanizing plant. At the south

A. T. ENLOW,
PRESIDENT AND GENERAL MANAGER

end of this bay is the black sheet storage; further along are the picking machines, washing tanks, storage tanks and galvanizing machines, while extending into the east bay are the cooling machines. The west bay has a monitor roof for providing sufficient ventilation. In handling the sheets, a five-ton electric crane is installed. The crane operates over the entire length of the west bay, and was built by the Northern Crane Works, Walkerville, Ont. When the black sheets arrive on the cars they are placed on hand trucks and weighed, and then moved into the west bay, where they are picked up by the electric crane and transferred to the store room. Here they are placed in piles, according to gauge. When undergoing treatment they are placed side up in crates, to which are attached crane hooks. An interesting feature about these crates is that they are made of "Monel" metal, each crate representing an outlay of $1,000. "Monel" metal possesses the characteristics of being able to withstand the corrosive action of the hot acid in the pickling tank and lasts indefinitely, whereas crates made of bronze would soon corrode. This metal is a by-product, and is obtained from Sudbury, Ont.

Pickling Process

The first process consists of pickling, where the sheets are treated with sulphuric acid to remove the scale and clean the surface, so that when being galvanized the spelter will adhere perfectly to the sheet. The pickling machine consists of two plunger tanks of the latest type, each tank being 12 ft. 6 in. x 3 ft. x 5 ft. deep, and having a capacity of from 100 to 300 sheets, according to gauge, at one operation. The tanks are constructed of solid 8 x 10 in. Georgia pine, and have a bottom of lead. At one side of each tank is a plunger, also made of Georgia pine. The plungers are mechanically operated, and are used to agitate the liquid in the tanks, by which means the sheets are kept separated so that the acid may work more effectually.

There are three pipe connections for each tank for water, sulphuric acid and steam, respectively, the latter accelerating the pickling process. Adjoining the pickling machine are two independent sulphuric acid storage tanks, one for each pickling tank, equipped with floats and gauges for regulating the quantity of acid used. The acid flows by gravity to the pickling tanks. The [illegible] acid tanks are connected to a large [illegible] building, and having

NEW PLANT OF DOMINION SHEET METAL CO., LTD., HAMILTON, ONT.

STORE ROOM FOR BLACK SHEETS.

SQUARING SHEETS ON SHEARING MACHINE

a capacity of 60,000 pounds. The acid is obtained from the Grasselli Chemical Co., which adjoins this plant. The steam for the pickling flush is obtained from a boiler, which will be referred to later in detail. The sheets remain in the pickling liquid for about thirty minutes, after which they are removed to the rinsing tanks.

The machinery for operating the plungers is located in a pit under the shop floor and adjacent to the tanks. The electric motor which drives the machinery is above the floor level, and is controlled by a "Wagner" polyphase motor starter. The motor is 10 h.p., 3-phase, 60-cycle, 220 volts, and was supplied by the Wagner Electric Mfg. Co., through their Toronto office.

A belt drive connects the motor to a pulley on the machine underneath, the power being transmitted to a crank shaft by a link-belt chain. A disc crank at the end of the shaft is connected by means of a connecting rod to another crank, which lifts a vertical rod up and down, thus operating the plungers. The motor starter and acid feed controller are located near together, both being within reach of the operator.

Washing Process

After the sheets have been in the pickling tanks the prescribed length of time, the crate holding them is lifted out by the crane which carries them over to the rinsing tanks near-by. These are two tanks constructed of wood, each being 3 ft. x 12 ft. 6 in. x 5 ft. deep. They contain clean, fresh water, which flows through in a continuous stream, thus effectively washing the sheets and removing all traces of acid. The sheets remain in the rinsing tanks for about thirty minutes.

If the sheets are not to be galvanized immediately, they are carried by the electric crane to storage tanks containing water, where they remain until required for further treatment. If required at the galvanizing machine, they are carried to the feed tank direct by the crane, after having first being inspected and placed in skips laid flat. In either case they are carefully inspected before any further treatment.

There are five storage tanks, each being 4 ft. 6 in. x 12 ft. 6 in. x 3 ft. deep. They are also made of wood and contain clean water. After inspection, the sheets are laid flat in a skip, which has a capacity of about 5 tons and placed in the tank.

Galvanizing Process

Great care and expert knowledge is required in this operation, which consists of coating the sheets with a thin layer of zinc spelter. It will shortly be possible to obtain Canadian smelted zinc. There are two galvanizing plants installed and are operated independently of each other. Each plant consists of a "pot" constructed of brick, and having a natural gas-fired furnace underneath. The "pot" contains the spelter, one charge weighing about 80,000 pounds, and also the machine for doing the galvanizing. The pot and furnace were constructed by the company, and the machine was supplied by the Berger Mfg. Co., Canton, Ohio. An interesting feature is the C. G. E. motor controller, which has 14 speeds ahead and reverse; by this means the speed of the sheet passing through the tank can be varied, as each different gauge of metal must be coated at a speed definitely determined in advance. The motor and drive for each machine are located in a pit near the machine, and thus do not obstruct the operators. The motors are each 7½ h.p., and were supplied by the Wagner Electric Mfg. Co.

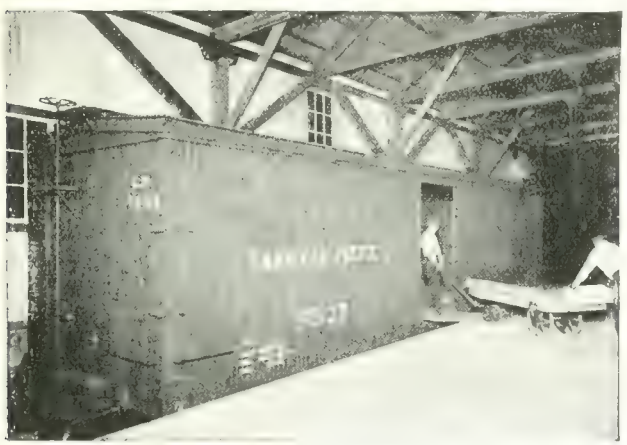
PICKLING DEPARTMENT WHERE SHEETS ARE PREPARED FOR GALVANIZING

Before being galvanized, the sheets are inspected and dipped in a tank containing muriatic acid; this acid cleans the sheets, and also acts as a flux or binding medium for the spelter. The sheets are fed from the tank through a pair of 6-in. rubber rolls through a bath of sal-ammoniac, which is a flux and floats at one end of the pot only, on top of the spelter. The sheets travel down on guides immersed in spelter through the bottom

rolls which carry the sheets along. The sheets then pass through another set of finishing rolls, which assist in the process, and also draw the sheets out of the pot. The speeds of the various sets of rollers vary, a feature which is carefully worked out in the construction of the drive gear. The temperature of the spelter in the pot is recorded on a pyrometer supplied by the Brown Electric Pyrometer Co., Philadelphia, Pa.

Cooling the Sheets

As the sheets leave the finishing rolls on a chain conveyor, they are carried between a series of rolls or levellers, which, as the name indicates, flattens out the sheets while hot. The sheets are then carried a short distance on another set of rollers to a table in front of the revolving cooling racks. On this table is a trip gear automatically operated, which places each sheet in position on each rack as the latter comes round. The cooling machine revolves very slowly, and, while doing so, compressed air is played on the sheets, giving to the smooth silvery surface that spangled appearance which distinguishes all galvanized sheets. The accompanying illustration will give the reader an idea as to the type of machine used for the cooling process. There are two of these automatic cooling machines installed, both having been built by the United Engineering and Foundry Co., Pittsburg, Pa. The cooling machines are operated by the motors that drive the galvanizing machines.



SHIPPING "PREMIER" GALVANIZED SHEETS.

By the time the sheets have travelled over to the other side of the cooler they are cool. They are then taken from the racks, placed on trucks and carefully inspected on both sides for any imperfection. Any sheets that are imperfect are placed on one side, while the perfect sheets are branded. The sheets are now finished and are loaded into cars, which are inside the shop, or are bundled, weighed, and taken to the warehouse to await shipment when required.

GALVANIZING MACHINE WITH FEED TANK

Heating and Lighting Feature

The boiler for heating the plant is located in the warehouse. The boiler is rated at 30 h.p., is of the horizontal return tubular type, and was built by E. Leonard & Sons, London, Ont. It is fired from waste heat from the galvanizing pot furnaces, but is also equipped with gas burners as a stand-by. This boiler also furnishes the steam for the pickling tanks.

Current from the Hydro-Electric system is used throughout the plant for the motors and the lighting system. In connection with the latter there are a number of 600-watt tungsten lamps installed, which give an exceptionally bright appearance to the interior of the shops. The offices are located in a separate building. On the property is a pond used for receiving the discharge from the acid tanks, a considerable saving in operating expenses being made by means of this.

Although the plant has only been in operation for a comparatively short period, the company has been very successful in producing a high-class sheet. The president and general manager of the company, A. T. Enlow, has had a lifelong experience in the sheet metal business, and is ably supported by an efficient technical staff. The company has thus been spared many of the troubles which would doubtless handicap a concern embarking on a new venture of this description under less favorable conditions.

The control of the mind as a working machine is the end of all education. This can be accomplished with deliberation.

INSPECTION DEPARTMENT AND AUTOMATIC COOLING MACHINES FOR FINISHED SHEETS

COPPER IN AMMUNITION

AMONG the many and varied uses of copper, its consumption in the manufacture of ammunition is not the least important, as is attested by the fact that some 20,000,000 lb. of copper is used for this purpose each year in the United States alone, in spite of the small degree to which military preparation for war is here developed. Within the past few months huge orders for the ammunition required in Europe have been placed with firms in this country, many of them concerns formerly engaged in making other kinds of goods, but who are not unwilling to modify their plants and procedure in order to benefit by the high prices paid for quick delivery of the various munitions now being consumed so lavishly. It is impossible to estimate how much copper is now being used for this purpose, but some idea may be gleaned from the way in which the price of the metal has risen in the past few months, and continues to rise in spite of the efforts of the mining companies to increase their output.

When copper in ammunition is mentioned, the natural association is with the brass cartridges used for ordinary rifles. Greater interest attaches to the cartridge cases for quick-firers and field guns. The case of the cartridge for a 3-in. gun weighs 1 lb. 5 oz., while that for a 6-in. gun weighs 28 lb. 14 oz. As in a million rifle cartridges only 23,000 to 26,000 lb. copper is used, it is seen that the greater weight of the larger cartridges tends to compensate for the less frequency with which they are fired. But there are other uses of copper in ammunition. Every shrapnel shell must have a copper band about it in order to prevent the escape of the gases of the explosion past the projectile; these rings average 2½ to 3 lb. in weight per shell. The copper expands under the impact of the explosion and makes a tight fit against the sides of the gun. This saves the wear caused by the rush of the gas past the projectile and increases the power of the gun; it also makes the projectile follow the rifling better.

Every cartridge requires a primer; these are made of copper or a soft brass rich in copper. The old-style lead bullet is not suitable for use in the modern high-power rifles, so the projectile is commonly made with a hard jacket over a lead core. An alloy of 85 per cent. copper and 15 per cent. nickel is the most suitable for this purpose. The Germans use sheet-steel cases for bullets, plating them to protect them from rust. The steel is believed to wear the rifling of [illegible] rapidly. [illegible] so quickly [illegible] One of the [illegible] a solid brass bullet. [illegible] shrapnel, contains antimony, hence the present demand and high price of that metal.

Spelter advances with the demand for copper in war. The brass used in the making of ammunition must be of the best quality, containing about 70 per cent. copper and 30 per cent. zinc, so it will not crack in working, nor be destroyed in firing, as all cartridges are reloaded. The specifications of the United States Army require cartridges to stand twenty reloadings without failure. The reason for this is that the case of a rifle cartridge costs 1½ cents, while the complete cartridge costs only 2½ cents, thus it is good economy to reload as often as possible. In making a case, flat discs are stamped out of brass sheets of the requisite thickness. The next operation cups the disc, and by a series of these it is formed into a cylinder, "necked-down" to the shape required, and the head is finally formed from the thick metal left in the base. After each operation the brass must be annealed, as the working makes it hard and it would crack on further working. Both the copper and spelter must be pure, as impurities make the brass hard and cause it to crack. Good electrolytic copper is pure enough, but the spelter must be purer than ordinary brands, which contain too much lead for this purpose. Spelter made from the franklinite and zincite ores of New Jersey and the blende from Tennessee, which are free from lead, therefore commands a premium over prime Western. This premium has recently been large enough to warrant the redistilling of ordinary spelter in order to purify it. Another reason for using brass of the highest quality should be pointed out. Brass is used for cartridges rather than copper, because the cases must possess sufficient resilience to spring away from the sides of the gun-chamber, after firing; otherwise the shell cannot be extracted, and the gun is temporarily out of commission. This is especially important in the case of quick-firing guns. If the case splits or cracks, it will stick in the chamber.

As previously stated, all cases are reloaded. But it must be remembered that it is a long way from Bukowina to the Naugatuck Valley of Connecticut, while many shells are lost on the battlefields and will not find their way back for reloading for a long time. Orders for ammunition are being based on immediate requirements; in the event of the war being protracted the rate of consumption will probably decline, and when peace is concluded enormous quantities of scrap brass will find their way into the markets of Europe. What effect this is likely to have on post-war copper consumption it is difficult to prophesy.—Queensland Mining Journal.

LUBRICATION OF PORTABLE AIR TOOLS

ENORMOUS numbers of compressed air hammers, drills, and other portable tools are in regular service in various engineering and mining services, and it is safe to say that a very large percentage of these tools are working at less than full efficiency and wearing out unnecessarily fast owing to improper lubrication. The volume of air passing through even the smallest tool is very large, and it has several prejudicial tendencies. In the first place, it tends to blow oil away from the air valves and piston into the exhaust passage, particularly since a thin oil is necessary for these high-speed parts. It tends also to oxidize any oil which is of a "drying" nature or contains oxidizable adulterants, and any "gumming" naturally means decreased efficiency and increased wear. Finally, unfiltered air carries with it dust in amounts which will only be appreciated by those who have had experience with air filters. Unless the latter be used, particles carried by the air will be deposited in the air compressors and air tool to the detriment of glands, valves, and cylinders.

Quite a simple air filter, consisting of several layers of muslin over a wood or wire framework, is sufficient over the air intake of the compressor, and efficient filter nipples are on the market for instant connection in any compressed air line supplying individual tools. By thus keeping dirt out of the tools half the battle of efficiency and durability is won. For the rest it suffices to give the working parts of the tool a thorough washing with paraffin once a week at least and once a day if the service is very heavy; and to lubricate liberally and regularly during working. A thin machine oil is suitable for hammer pistons and valves, and a supply should be given every hour or so during regular working. Gear and crank cases should be filled with high quality grease once a shift. In the air compressor itself it is best to use one of the special graphite lubricants, since accumulations of oily matter in air containers and pipe lines are apt to cause spontaneous combustion and explosions.

YOUR GREATEST work—a work in which there can be no failure for the earnest and sincere man—your greatest opportunity in life, will be found shoulder to shoulder with your fellow-man, doing the things good for all of us. Thus in serving yourself, you will serve your neighbor, your community, your state and your nation. You will be doing your work in helping to perpetuate the civilization of the entire world.

Presses for the Manufacture of Shells and Shell Cases*

By William Rodger**

The question of the best type of press to install for the production of steel shell forgings or brass cartridge cases appears to be more or less an open one. In the discussion following the reading of the accompanying paper, both power and hydraulically operated presses were championed, although operations of varying nature occasionally call for the employment of

IN connection with the manufacture of cartridges and shells, the question raised is whether an hydraulic or power type is the most economical and efficient press for the manufacture of cartridges and shells. The writer is fully aware that economy in some cases is unattainable if the plant has been laid out for the manufacture of material other than the work above designated, but by careful attention to the lay-out, economy can be attained. It is purposed in this paper to deal with the following types of hydraulic and power plant presses:—

1—Steam pump press.
2—Motor driven pump press.
3—Motor driven power press.
4 Direct steam press.

Steam Pump Press

Boilers are required to generate steam to drive the pumps, and the pumps must be sufficiently large to supply the water at the required pressure and velocity to keep up the accumulator when the presses are in operation. It is absolutely essential that a receiving tank should be installed, having a direct connection with the water main and in order to prevent the pumps drawing air, care should be taken to ensure a sufficient height of water being maintained above the suction pipe at the pump. The water so pumped into the accumulator, performs the work in the press and exhausts back to the receiving tank, thus setting up a standard of economy in the supply of water. A stop valve should be fixed in the main intake to close the water supply when the pump is not in operation and thus guard against an overflow of the tank. In this type of press, economy in steam power can be attained by the use of a trip valve operated automatically, which cuts out the steam when the press is not in operation.

It is policy, when installing this type of press, to make the pumps 25 per cent. larger than actually required, and the writer is also of the opinion that it indicates good judgment on the part of the engineer, as at times the pump is liable to give out with an overload on the press. The pressure of water per square inch is obtained by the steam pressure on the piston, and the load is transmitted through the crank shaft to the plungers; consequently any pressure per square inch can be attained. An hydraulic intensifier is capable of transforming low pressure, as from a main, into a useful hydraulic pressure, therefore, by this means, additional pressure can be transmitted to the accumulator.

The accumulator is undoubtedly the most important adjunct in hydraulic transmission, constituting an artificial head, by which the pressure of water is transmitted to the press by the aid of

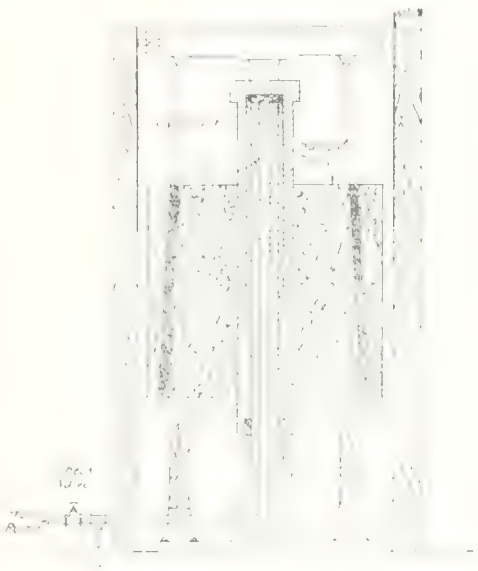


FIG. 1.—ACCUMULATOR.

material in addition to water power. Fig. 1 illustrates an accumulator having a ram 21 feet long, 12 inches diameter and 4 inches thick. The lower part of the ram is cast with a tapered collar 14 inches in length having a diameter sufficiently large to ensure a pressure of not more than 545 lbs. per square inch on the supporting surface; there is also an elliptical boss on collar for pipe connection. From the collar to the lower extremity, the diameter of the ram is 18 inches and the length 21 inches. It is machined to gauge to fit into the bottom base. The base is made of cast iron about six feet square and six inches thick, and is bored to gauge to receive the ram.

The cylinder is a large cast iron pipe closed at the upper end and surmounted by a cross-head to which are attached stay-rods leading to the floor of the ballast drum. The lower flange of the cylinder carries the ballast drum, and immediately below this flange, the cylinder is extended to form a stuffing box. The gland is also made of cast iron, being cast in halves in order to facilitate packing.

The ballast drum is about ten feet in height, having a diameter also of ten feet. It is made of quarter inch plates riveted together, having 4 x 4 x ½ angles at the bottom and 3 x 3 x ½ at the top. The lower plate of the drum is of ¾ inch boiler plate made in halves, having tees riveted at the bottom, radiating from the centre to the outer edge to which the stay rods are pinned. It is essential that the stay rods should be made strong to stand the stress due to weight of the ballast in the drum.

On a ram 12 inches diameter, having a similar size of drum, the quantity of ballast required to maintain a pressure of 1,500 lbs. per square inch would be approximately 145,000 lbs. The ballast preferred for this purpose would be iron cuttings and punchings. The following is the ratio of various materials which could be used as ballast:—Pig iron, 6.25 cubic feet per ton; broken stone, 17.2; clay or earth, 18.5; bricks, 22.2.

The accumulator requires to be fixed on good concrete foundation, about six feet deep by eight feet square, made amply strong to carry the load and the weight. Between the accumulator and the pump is placed a by-pass with pilot valve. This is operated automatically by the upstrokes of the ram, which contacts with a weight connected with a wire rope travelling over a pulley fixed to the roof or girder of the building, and joined to lever of the pilot valve, thus reversing the action of the water and closing the connection from the pump to the accumulator. The service pipe to the press, the absorber, and the check valve are fixed between the by-pass valve and the accumulator. The absorber is used to reduce the shock when accumulator is in operation and in turn the check valve prevents the return of the water to the pump.

Hydraulic Press

The position of the presses should be known relative to the pump and accumulator in order that the pipes may be arranged to eliminate right angle bends, thus preventing sudden shocks and bursting of pipes, which would materially re-

*From a paper before the Canadian Railway Club, Montreal.

**Elevator Draftsman, C.P.R., Montreal.

tard the output. It is desirable that the pipe leading from the pump to the accumulator should be larger than the pipes leading from the accumulator to the presses.

A loss of power occurs when flowing water passes round a sharp bend or angle, or when it is subjected to sudden force. When easy bends are used there is practically no loss of energy in this direction, but with sharp bends and elbows the loss may be greatly increased. These facts point to the necessity of avoiding, as far as possible, all sharp edge inlets to ports. The best results are obtained when the water passages from the pump to the press are designed so as to ensure all the changes of direction and velocity being as gradual as possible.

If a hydraulic plant is well designed, the loss of useful effect between the pump and an accumulator properly packed, is but little. After various researches the writer found that Mr. Tweddell had compiled some careful records of the working of two pumps delivering water to the accumulator. What

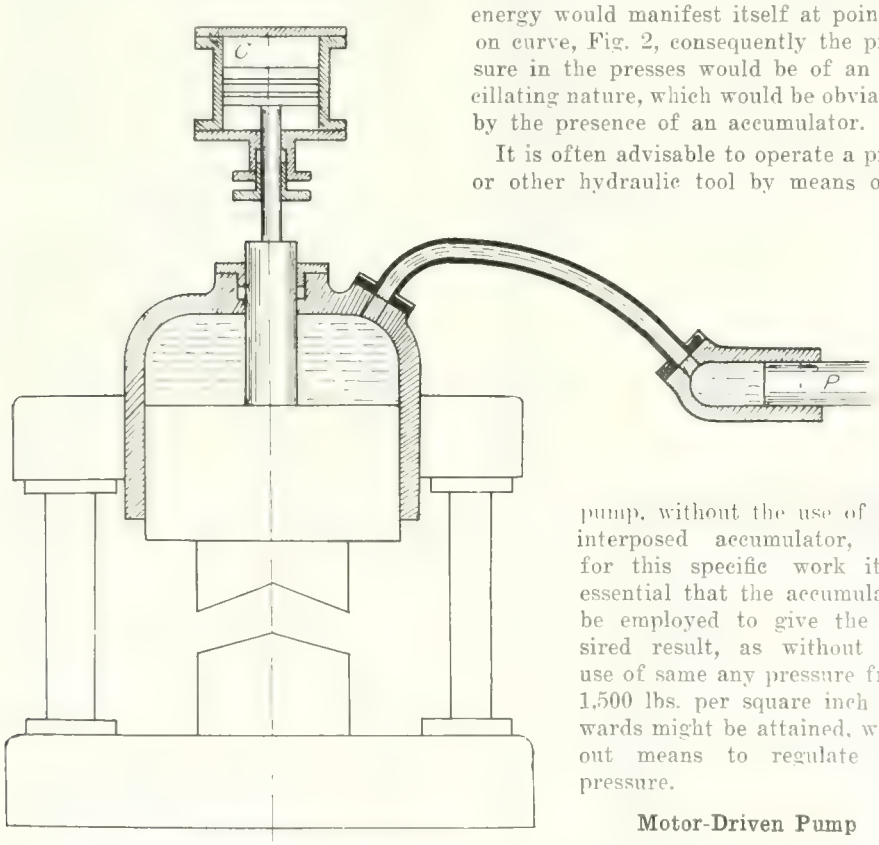


FIG. 3. "ALLEN" PRESS

he found to be the theoretical delivery for twenty strokes of one pump to raise the ram to the exact height was 1,694 cubic inches of water, whereas the actual delivery was 1,614 cubic inches only, consequently a loss of 4¾ per cent. With both pumps working for a similar number of strokes, the theoretical delivery was 3,388 cubic inches, whereas the actual was 3,278 cubic inches, showing a loss of 3¼ per cent. only.

At the time these experiments were made, it was noticed that the ascending pressure in the accumulator indicated 1,250 lbs. per square inch, while the de-

FIG. 2. PUMP DELIVERY CURVE

scending pressure indicated 1,225 lbs. per square inch. Thus, it will be observed, in the ascending stroke, in addition to lifting the load, the pumps had to overcome the friction, and the descending friction, as will be readily appreciated would be half the difference of pressure in both instances, i.e., 12½ lbs. per sq. inch, equivalent to one per cent. of the total pressure.

In the manufacture of cartridges and shells, the writer considers that the use of an accumulator is indispensable. To illustrate this point; should a triplex pump, which gives a more even flow of water pressure, be used, a certain loss of energy would manifest itself at point A on curve, Fig. 2, consequently the pressure in the presses would be of an oscillating nature, which would be obviated by the presence of an accumulator.

It is often advisable to operate a press or other hydraulic tool by means of a pump, without the use of any interposed accumulator, but for this specific work it is essential that the accumulator be employed to give the desired result, as without the use of same any pressure from 1,500 lbs. per square inch upwards might be attained, without means to regulate the pressure.

Motor-Driven Pump

This type of hydraulic plant is operated by a steam-driven generator which supplies current to the motor driving the power pump. The electrical generator is driven by a high-speed engine, having a short cut off, which consequently will use less steam and consume less coal than a high pressure steam pump. This class of engine will use steam at the rate of 10.8 to about 20 lbs. per i.h.p. hour, while a steam pump working at 150 lbs. boiler pressure would use approximately 80 lbs. per i.h.p. hour. Hence the motor driven pump has the advantage over the direct steam pump, and the effect is a saving of four to eight times, which would more than cover the cost of the auxiliary plant.

The most efficient power pump that will overcome the trouble due to uneven flow of water is the triplex pump, for in this type the pulsations overlap each other, the cranks being set to 120 degrees apart, in such manner that the combined discharge from the cylinder is practically uniform in quantity and pressure.

Motor Driven Power Press

This type is purely mechanical, and is operated by an electrical motor arranged in any suitable way. There are many ways of driving the power press, and it is the opinion of the writer that the best method is by a motor-driven countershaft, which obviates the necessity of a special self-starting rheostat.

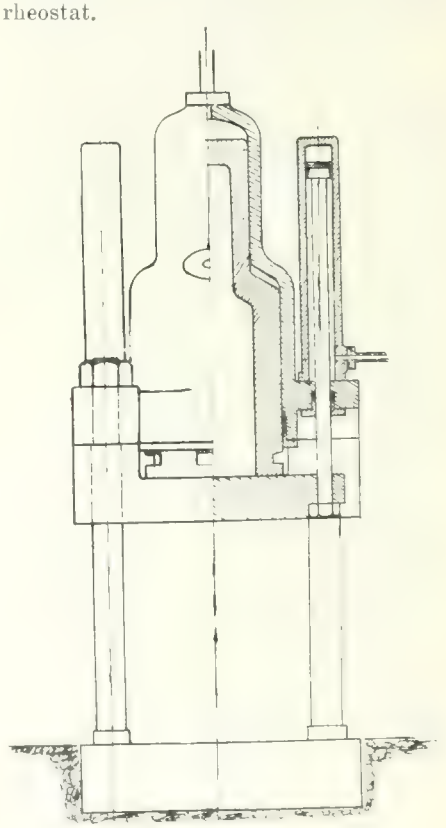
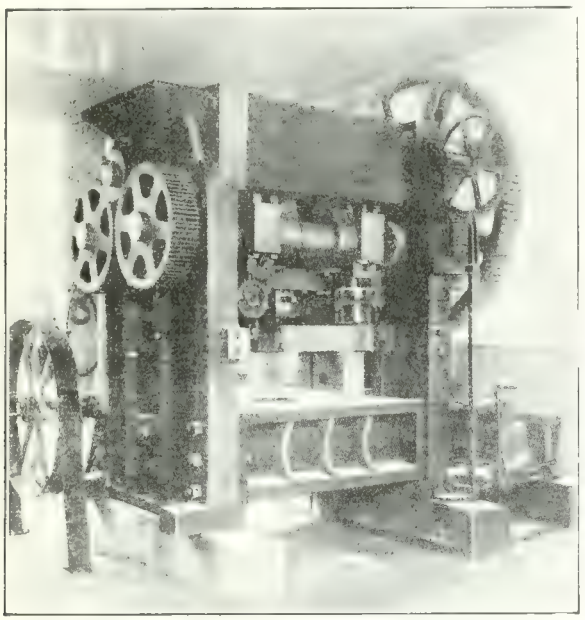


FIG. 4. TANDEM CYLINDER HYDRAULIC PRESS.

In connection with the above type of press, to obtain an even pressure, Taylor & Challen, England, found it necessary to introduce four cranks with connecting rods operated by two crank shafts, and from the illustration it will be seen how the drive is effected.

The other type of press is oper-

ated by motor, the power being transmitted through a worm. The worm is screwed right and left hand, with a crosshead placed on each side, and the moving table has a vertical guide



FOUR CRANK POWER PRESS BY TAYLOR AND CHALLEN, LTD.

bar fixed thereon, which slides through the top platen. The vertical motion is made by four links, two of which are fixed to the top platen, and two to the guide bar, and connected to crosshead on either side. When the worm revolves the crosshead travels inwards towards the centre and presses the table on the material and vice versa releases the pressure.

Direct Steam Press

This type would not be suitable for shell or cartridge making, as it is not possible to attain the required pressure per square inch at the back of the piston. The expense likely to be incurred in the installation of a high pressure boiler for this work would be far too great, for, in addition, the introduction of a crank system would be required to attain a pressure of 800 lbs. per square inch.

Having dealt with the four types of presses, the writer will endeavor to demonstrate the superiority of the hydraulic press with a motor driven pump, as compared with the steam pump press and a motor driven power press. Before entering into details it will be interesting to note the records made by Professor Robinson:

Flow of Solids.—Hydraulic forging has revolutionized the treatment of large masses of iron and steel by enabling immense pressure to be brought to bear on hot metal plates, or masses of iron and steel. By means of fluid compression, ingots are produced of a soundness which was hitherto impossible of accomplishment, and by hydraulic pressure masses of metal can be squeezed into required shapes far better than by blows from a steam hammer.

The employment in recent years of iron in increasingly large masses has involved the consideration of how the continuity of the fibre can be maintained and what the conditions are which have to be observed in order to prevent break of continuity, or a diminution of the calculated strength of the mass. Investigations by the late Mr. Tresca, recorded in the Proceedings of the Inst. of Mechanical Engineers (dated 1868 and 1878), have thrown light on the subject and would be of practical value with regard to forgings made under pressure or squeezed, instead of being forged under a hammer and formed by means of blows. Mr. Tresca applied the expression "the flow of solids," and the singular fact he established indicated that an entirely new branch of observation had been opened out, to which M. De St. Venant gave the name of Plastic Dynamics.

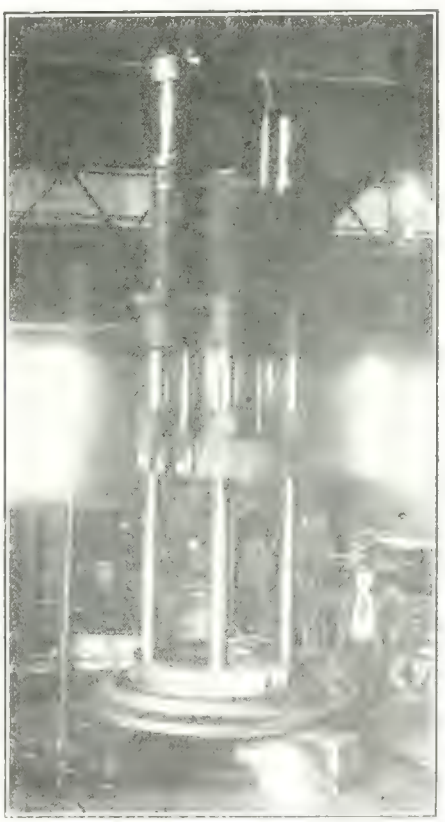
Presses for 18-Pounder Shrapnel Shell Forgings

The presses for the manufacture of 18-pdr. shells are fixed on a concrete foundation surmounted with a cast iron base through which four steel columns, eight inches diameter, pass, and are held at lower extremity with solid hexagon nuts. These columns support the main cylinder by means of a collar, and are also held in position by solid hexagon nuts. The columns also guide the moving table which is bushed in halves to facilitate the placing or the replacement of the bushes, and a retaining ring is used to hold the bushes in position. The draw-back cylinders are bolted to the main cylinder and the rams are made fast to the crosshead and connected to the moving table by two columns of about five inches diameter. In this manner the pressure is released from the tools.

The height of the press complete is approximately 21 feet and there are two classes: The first has a capacity of 350 tons pressure, the second having a capacity of 225 tons only. The presses are constructed having the main ram common to both, while the difference of pressure is accounted for by the diameter of the draw back cylinders, which in this instance would be 8 and 10½ inches, respectively. The stroke of the ram in the former press is thirty-six inches and in the latter forty-five inches.

In the production of heavy forgings from large ingots of mild steel, it is essential that every part of the ingot should be equally worked if the resultant forging is to be homogeneous in structure. Where a steam hammer is used, the energy of the blow is absorbed in producing distortion of the outer layers while the interior is practically unaffected. This disadvantage is overcome by the use of the hydraulic forging press with its slow and powerful compression, it gradually supplanting the steam hammer for the production of very heavy forgings.

The "Allen press (Fig. 3) works on a very ingenious principle. Here a pressure accumulator is necessary, likewise the valves in the high pressure water column. For its operation a low water pressure supply, approximately of 200 to 300 lbs. per square inch, is necessary, and during the idle part of the stroke this follows up the ram, the high pressure connecting pipe being kept full. In the meantime, when the pressure is required, this supply is cut off and communication is made with the high pressure pump. The pump has no valves, hence the ram has a continuous up and down motion, the water column simply following the motion of the pump plunger. The momentum of this column thus has a useful effect in increasing pressure on the ram at the end



HYDRAULIC PRESS FOR PRODUCTION OF 18-PDR. SHELLS

of the working stroke. A steam cylinder is usually provided for lifting the ram.

Fig. 1 shows a type of hydraulic press having two cylinders with two draw backs, to which the pressure is supplied by an accumulator and air pressure. It can be operated for three distinct loads, and is constructed to carry any load. The top cylinder is of 21 inches diameter and the lower cylinder has a diameter of 36 inches. It will be readily seen that this type of press is particularly advantageous and can be profitably adapted to the manufacture of shells, heavy forgings, cartridges, etc.

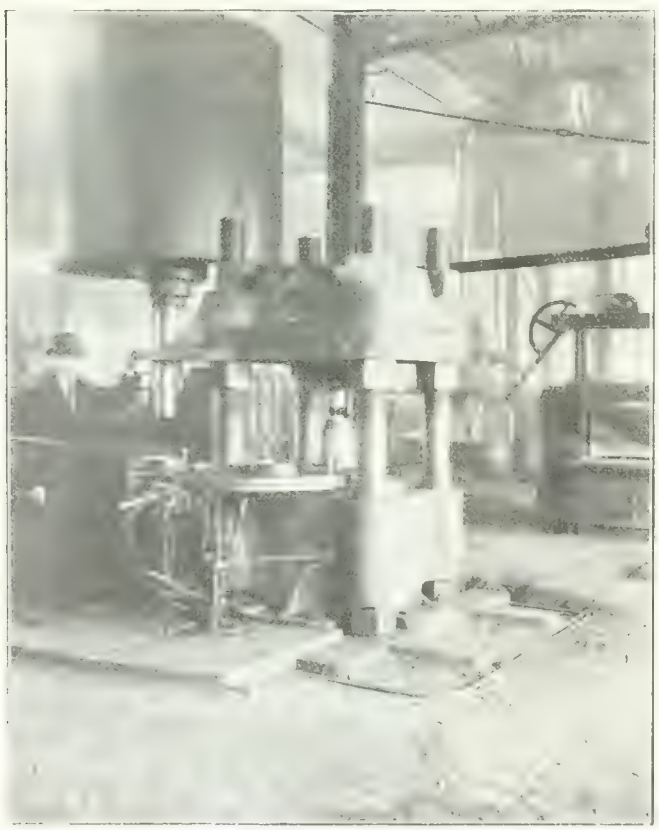
The hydraulic press has the advantage over the power press, as it is necessary for the latter to have some means of bringing down the moving table, either by a crank or toggle arrangement. A power press with crank, having a short travel similar to press manufactured by Taylor & Challen (already described) would not be practical for this specific work, as a stroke of 36 to 45 inches is required. The crank motion also has a tendency to fly out on a tangent, thus causing the tools or dies to get out of line. With the toggle arrangement a similar trouble would be experienced, although the travel required would be attained.

Cartridge Case Heading and Indenting

In the manufacture of cartridge cases presses are built for indenting and heading 18 pdr., and 4.5 sizes. It was found for this particular operation that the pressure required was 800 tons. The cylinder of the press is made of cast steel, similar in shape to a goblet, with a cast iron ram of 36 inches diameter, the lower portion being 8 inches diameter only, to serve as a guide for the main ram, in which a hole three inches in diameter is cored to the bottom of the guide, in order that the benefit of 36 inches area might be derived. The four columns are carried by four lugs cast on the upper part of the cylinder, the columns being surmounted with a cast steel platen.

A fixed table is bolted to the top of the ram above which a movable table is fixed, riding on ball-races, for the purpose of facilitating the operation of bringing the dies to dead centre; the dies being kept in position while indenting and heading by notches cut at equal distance on the outer edge of the revolving table.

It is very important that the work of indenting and heading the cartridge be accurate, and the press most suitable for this class of work is without doubt the hydraulic, as although the required pressure can be attained by the power press, its accuracy cannot be relied upon. The material in present use is bronze and the cartridge on completion of the operation of the hydraulic press is isotropic. In other words, the stress is equal, both lateral and vertical. This could not be attained by the power press, because of unequal pressure, its agencies being contrary to downward motion, and the result an irregular section.



800 TON HYDRAULIC PRESS FOR CARTRIDGE CASE HEADING AND INDENTING.

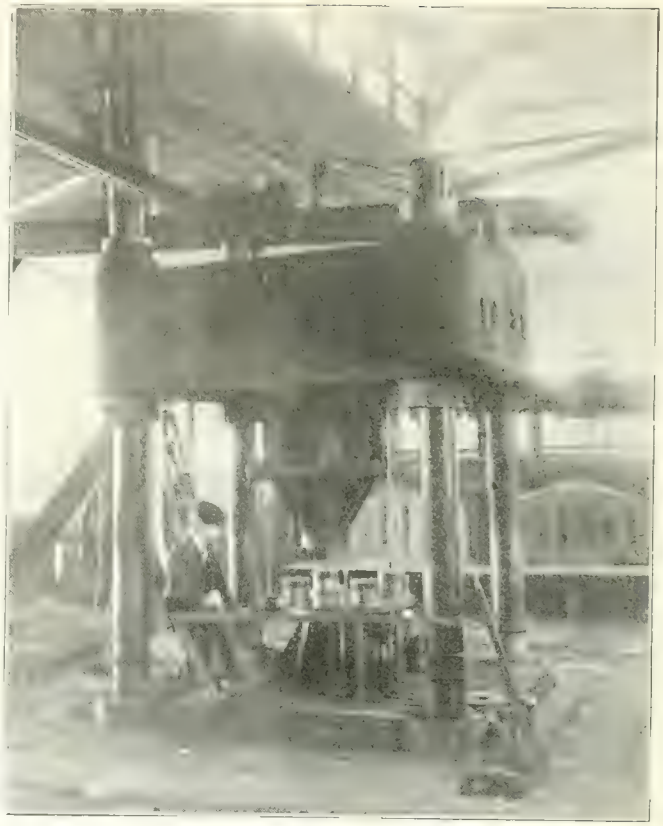


FIG. 7. 500 TON HYDRAULIC PRESS.

1916 FOUNDRY EXHIBIT AT CLEVELAND

AT a recent meeting of the executive committee of the American Foundrymen's Association at Cleveland it was decided to receive bids for the conduct of the exhibition of foundry machinery and supplies which will be held in connection with the convention at Cleveland next year. For several years the exhibition has been under the control of the Foundry & Machine Exhibition Company. It is understood that bids are to be opened Nov. 13 at Cleveland, and that the successful bidder will manage the exhibition for the foundrymen, the net profits to go to the associations and the exhibitors.

ECONOMICAL VANADIUM IRON CASTINGS

THE problem of cheapening production without impairing quality is one that is always with us, and it will be of greater importance than ever in the years of industrial rivalry following the war. The use of the cheapest suitable materials is by no means the least fruitful of the many possible fields of economy, and in this connection it is interesting to note

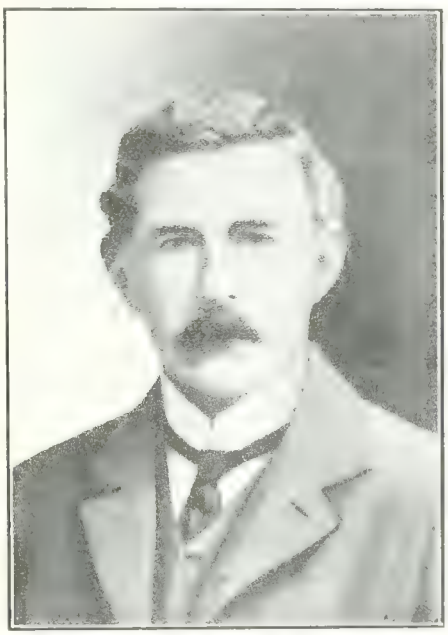
the results of a series of tests recently conducted by Prof. Fitch on vanadium castings. It appears that a pig iron containing silicon 2.00; sulphur, 0.02; phosphorus, 0.58; manganese, 0.69; carbon, 3.62 (0.55 combined); titanium, 0.022; and vanadium, 0.04 per cent., has unusually high scrap-carrying abilities and that nothing is to be gained from using a mixture of pig iron and scrap containing a large proportion of pig iron, even for automobile cylinders, or other work requiring soft, dense, machinable metal.

A series of tests was conducted on castings containing from zero to 80 per cent. scrap of the following composition: Silicon, 1.74; sulphur, 0.09; phosphorus, 0.49; manganese, 0.36; carbon, 3.30 (0.75 combined); titanium, 0.04; vanadium, 0.01 per cent. It was found that the test data lay between the following limits for specimens with from 20 to 80 per cent. scrap, the bracketed figures referring to pure pig specimens: Tensile, 22,000-26,500 (25,200) lb.; modulus of transverse rupture, 48,000-55,000 (50,600) lb. per sq. in.; deflection (12-in. centres), 0.086-0.116 (0.097) in.; shrinkage per foot, .11-.125 in. (.11 in.) in green sand and .125-.15 in. (.13.) against a chill; scleroscope reading (tool steel 100) 35.3-36.1 (36.3); pouring temperature, 2,125-2,475 deg. F. (2,280 deg.). These figures give a good indication of the scrap-carrying capacity of the pig and of the strength and resiliency of vanadium castings.

Using pig of the composition stated and scrap not differing much from the above analysis, it is recommended that a 50 per cent. mixture be used for all but heavy castings (wherein no part is less than 2 in. thick). Sixty per cent. gray iron machinery scrap gives good medium castings, and no less than 80 per cent. scrap can be used for heavy casting. Castings of these compositions are claimed to be easy to machine, soft and close grained, and easily susceptible to high polish. The possibilities of high-scrap, vanadium castings are distinctly worth bearing in mind for practically all classes of work.

THE CAUSE OF RUPTURED FLY-WHEELS

WHEN a flywheel cools after casting the rim and central boss remain hot much longer than the arms, and thus continue to shrink after the arms have set rigidly. This is where the mischief occurs. The shrinking rim and boss subject the arms to mixed stresses, and the arms resist the shrinkage of the rim and boss. The net result is that, though the wheel does not fracture at the time of cooling, yet it is in such a condition of internal stress of tension that a slight excess of speed of revolution above the normal is liable to fracture it. The majority of the fractures of flywheels originate from this cause alone. A great deal can be done, however, in proportioning the rim, arms and boss, or by hastening the cooling of the rim and boss, and delaying that of the arms, so that the cooling shall take place in about equal times. This is properly done in cast iron flywheels, but as there is always an element of risk, the practice has grown of abandoning such wheels in favor of those built up in separate pieces, bolted together, and in another direction of using arms of wrought iron with rims and bosses cast around the ends of the arms. Therefore, though cast iron



W. L. HICHENS, ESQ.,

Chairman Cammell, Laird & Co., Birkenhead and Sheffield, England, who has returned to Canada to assist in the work of organizing additional production in

is used for wheels of small and moderate dimensions, the composite wheels are almost invariably used for those of large dimensions.

MILL CONSTRUCTION

MILL construction consists in so disposing the timber and plans in heavy and solid masses as to expose the least number of corners or ignitible projections to fire, to the end also that when fire occurs it may be most readily reached by water from sprinklers or hose.

It consists in separating every floor from every other floor by incombustible stops—by automatic hatchways, by encasing stairways either in brick or other incombustible partitions so that a fire shall be retarded in passing from floor to floor to the utmost that is consistent with the use of wood or any material in construction that is not absolutely proof against fire from any source.

It consists in guarding the ceilings over all specially hazardous stock or processes with fire-retarding material, such as plastering laid on wire-lath, or expanded metal, or upon wooden dovetailed lath, following the lines of the ceiling and of the timbers without any interspaces between the plastering and the wood; or else in protecting ceilings over hazardous places with asbestos aircell board, sheet metal, "Sackett" wall board, or other fire-retardant.

It consists not only in so constructing the mill, workshop or warehouse that fire shall pass as slowly as possible from one part of the building to another, but also in providing all suitable safeguards against fire.

Vertical openings throughout buildings as far as stairs and elevators are concerned, rapidly communicate fire to all storeys. With buildings of considerable height or combustible contents, this is likely to result in fire conditions beyond fire department control. All such floor openings should be enclosed in brick-wall shafts, crowned by thin glass skylight, and extended through roofs having fire doors with openings to storeys. Enclosed vertical openings are considered to be the most prominent features contributing to fire cost and loss of life. Neglect to guard these openings is common. Pains should be taken to rectify this condition in all existing buildings as well as in those hereafter erected, particularly if of mercantile, manufacture or storage occupancy.—Ex.

MUNITIONS CLASSES IN SCOTLAND

CONSIDERABLE interest is being evinced in these classes, and already between 1,200 and 1,300 applications from intending students have been received by the governors of the Glasgow Technical College, although the classes must, for the present, be limited to thirty workers at a time. At the moment this is the total number of lathes available, and, withal, larger engineering works being so fully occupied on Government contracts, the only possible chance of increasing this number is to get some on loan from smaller tradesmen who might be able to spare them.

WATER meters in London, Ont., numbered 2,562 January 1, 1915, an increase of 486 during the previous year. Only 17 per cent. of services are metered, although 24 per cent. of the water consumed passes through meters and furnishes 40 per cent. of the revenue. Each inhabitant of this town of 56,000 population consumes on the average 81 Imperial gallons per day and the cost of the water is $34.15 per million gallons.

PROGRESS IN NEW EQUIPMENT

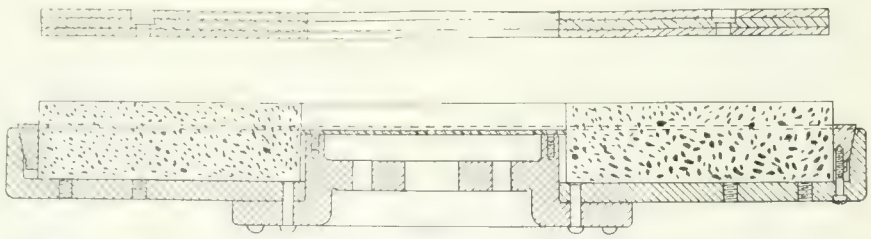
A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

WIDE FACE RING WHEEL GRINDER

An improved flat surface grinder of the ring wheel type has just been placed on the market by Charles H. Besly & Co., 120 North Clinton St., Chicago. This machine is called a Besly Wide Face Ring Wheel Grinder, and as shown in Fig. 1, is similar to the single spindle lever feed Besly disc grinder except that for roughing off scale and excess stock one end of the spindle is equipped with a pressed steel chuck holding a wide face vitrified ring wheel. This grinding wheel has 8 inches to 10 inches width of grinding face, so that work may be allowed to "float" on this broad face, while grinding; same as is done on the usual steel disc wheels covered with cloth abrasive discs.

These vitrified grinding wheels are more efficient and economical than cloth back abrasive discs for heavy rough grinding on scale; in fact, large rough work may be accomplished on the wide face ring wheel grinder which cannot be done at all on the ordinary disc grinder.

Besly grinders have, heretofore, been equipped with ring wheel chucks for rough grinding, but with comparatively narrow-faced ring wheels which made it necessary to rigidly clamp any work which was to be ground. The advantage of the wide face ring wheel as compared with the original narrow face ring wheel is that much work may be "floated" against the wide face wheel as in disc grinding and ground without clamping. This saves time in chucking. There is a further saving in the time of grinding because with the wide face ring wheel more cutting points are in action, as it grinds all over the face of the work at once—side swiping. The opposite end of spindle is equipped with the usual steel disc wheel set up with cloth back abrasive discs for finish grinding.



PRESSED STEEL CHUCK WITH CLAMP RING AND LAMINATED PACKING PLATE.

Chuck body is pressed steel, double riveted to a cast iron centre. Construction of this centre is such that spindle bearing projects into the chuck, thereby minimizing overhang. Chuck body is drilled and tapped from the back to receive headless threaded plugs for balancing. Grinding wheel is held in the chuck by pressure over its periphery. This pressure is applied by means of a wrought steel tapered clamp ring, passing around the grinding wheel. This ring is drawn into the tapered chuck body by means of clamp screws operated from the back of the chuck body. A suitable steel plate is provided to fit the centre hole of the grinding wheel and guard the heads of the screws which hold the chuck on the grinder spindle; so there are no external projections. This makes the chuck especially safe. As grinding wheel wears away, it may be set out in the chuck by means of a laminated wood plate supplied with the chuck.

The Besly wide face ring wheel grinder is built in two sizes: No. 17 carrying vitrified grinding wheel 24-inch diameter, 8-inch hole, 8-inch width of grinding face, illustrated in Fig. 1, and No. 16 carrying vitrified grinding wheel 30-inch diameter, 10-inch hole, 10-inch width of grinding face. All ring wheels are 3-inch thick when new and may be worn down to 1 inch in thickness.

Examples of economical surfacing are shown in Figs. 2 and 3, the former showing grinding of pillow blocks and caps. The 6 in. x 13 in. bottom surface of the cast iron pillow block was formerly done on a variable speed, motor driven shaper, using high speed tools to the limit of their capacity. In order to make this suitable for grinding instead of shaping, the pattern was changed. Very little stock was left for finish, and surface

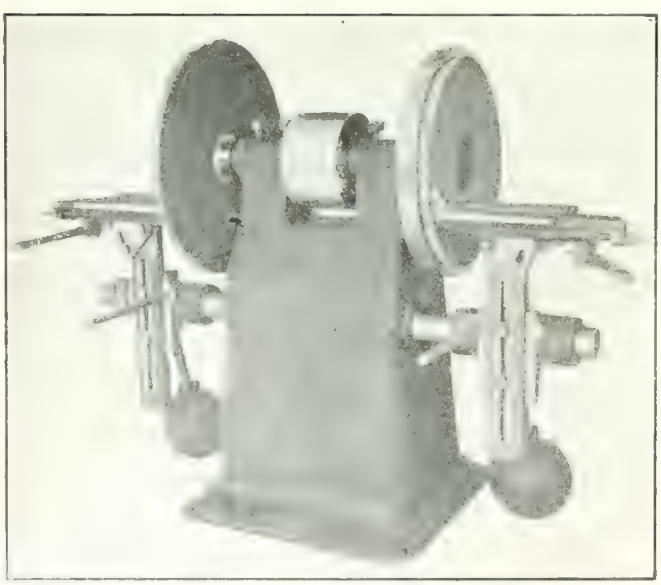


FIG. 1. NO. 17 GRINDER WITH 24 INCH DIAMETER WHEEL.

FIG. 2. GRINDING CAST IRON PILLOW BLOCKS AND CAPS.

was recessed in molding to facilitate grinding. By a little care on the part of the moulder, these castings came to the grinder with a maximum of 1/16 in. stock for finish.

The No. 17 Besly wide face ring wheel grinder roughed and finished these surfaces, to size and flat—tested on surface plate, in less than two minutes. Former time on shaper was about twenty minutes. Allowing for careless moulding, necessitating the removal of ⅛ in. of stock, the grinder accomplishes the work in three minutes as against 20 minutes for the shaper, this time covering all work, floor to floor, including surface plate test. It will be noted that these heavy pillow blocks and caps are ground without rigid chucking—the work "floats" against the grinding wheel both in roughing and finishing operations.

Referring to Fig. 3 which shows grinding of automobile gear shifter covers; these castings are malleable iron and rather frail. As they are ground without rigid chucking, there is no chance to distort the casting as when rigidly clamped for milling.

The grinder workholder is very simple. The work rests loosely on three studs projecting from the face of the angle plate. The work is located and supported on this three-point bearing by means of four studs projecting from the angle plate. The time on this job is 200 grinding operations per hour, per operator, or 100 castings roughed and finished per hour, per operator. As machine accommodates two operators, the production per machine is double that above mentioned. The geared lever feed work table used on this Besly grinder gives the operator a leverage of 20 to 1, so that with a very slight pressure of the operator's hand, the work is forced against the grinding wheel with sufficient pressure to secure maximum grinding efficiency.

To secure the best results, it is necessary to use care in designing pattern-making and moulding, so that the work may come to the grinder with the minimum amount of stock for finish, and large surfaces should be relieved to facilitate grinding.

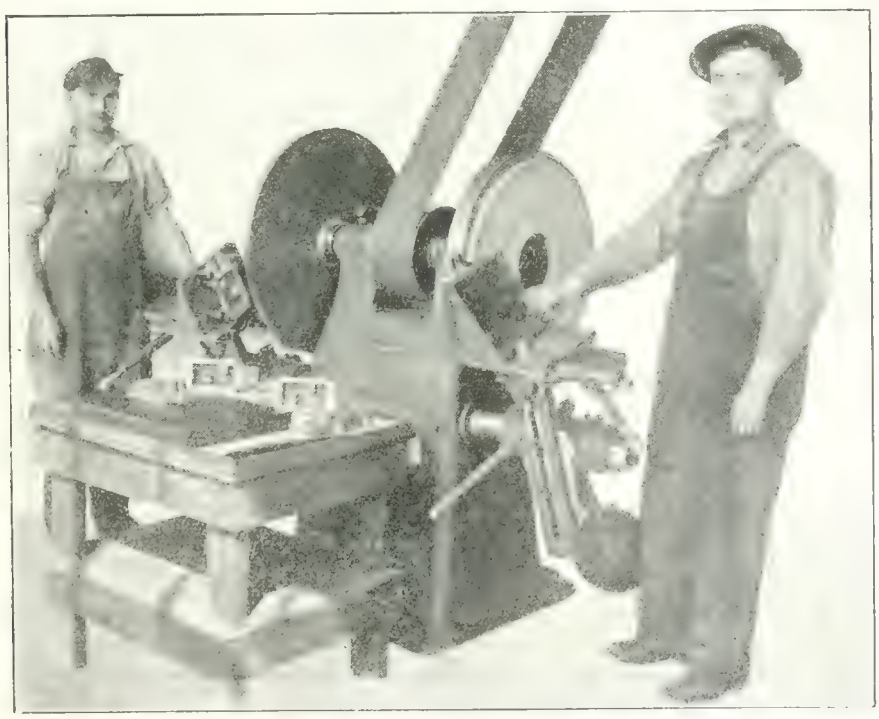
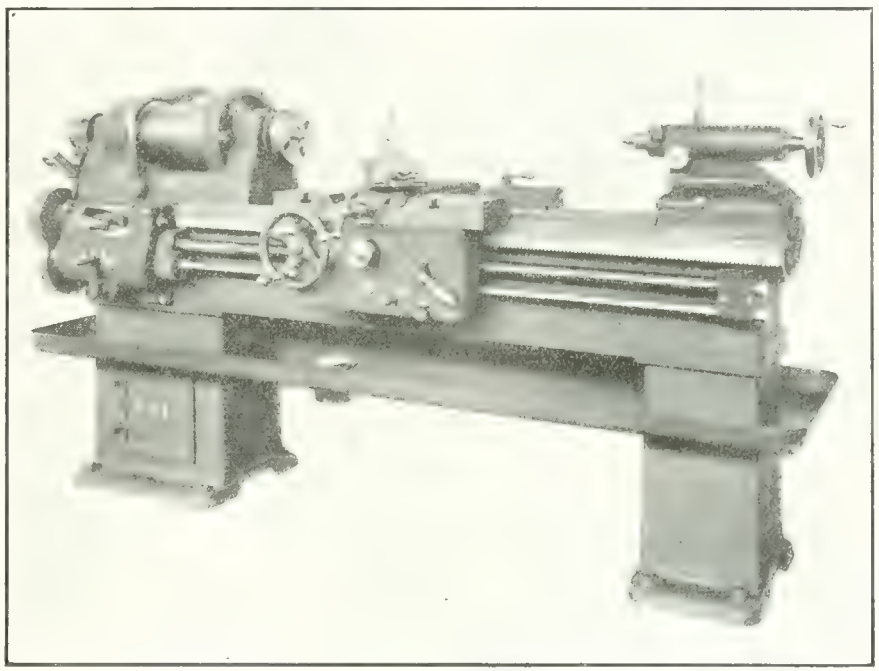


FIG. 3. GRINDING SMALL MALLEABLE IRON CASTINGS.

16 IN. HEAVY DUTY ENGINE LATHE

THE 16-in. "Oliver" engine lathe embodies in its construction a number of new ideas in design. It is built with ample power and is quite rigid for heavy and fast cuts.

The headstock is of three-step double back-geared type, using 3¾ in. wide belt. The spindle is large in diameter, with long bearings, lubricated by means of felt wipers feeding from large pockets. Spindle is of special high carbon steel accurately ground. The cone pulley is so designed as to carry a large oil reservoir, which provides lubricant at all times. The drive pinions for the back gears are one solid forging made of special high carbon steel and pressed into the cone pulley, keyed on, and reinforced by three filister head screws. A replaceable bronze bushing gives the proper bearing for the spindle in these gears. Thrust is taken against the front end of the rear bearing housing on a hardened and ground steel collar.



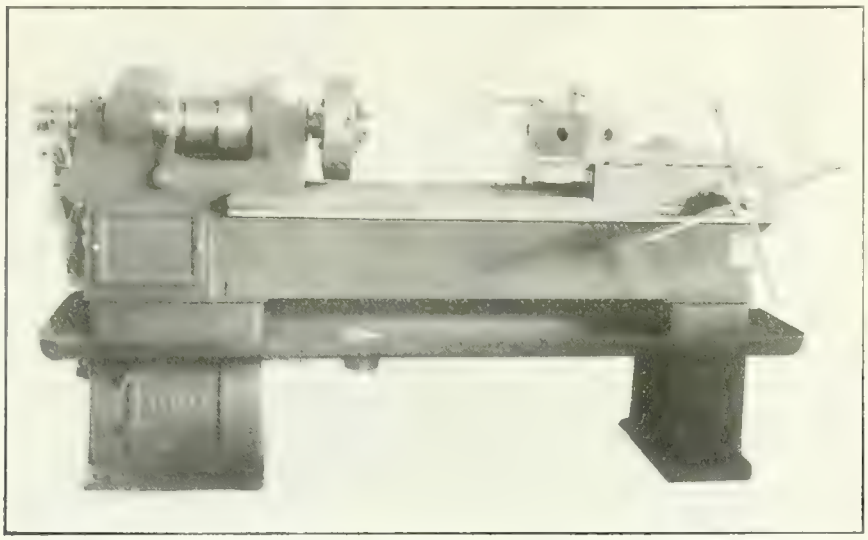
16 INCH HEAVY DUTY ENGINE LATHE

The bed is of very liberal proportions, being 7 ft. 2 in. long x 13 in. deep x 15 in. wide, and is strongly reinforced by boxed sections. The supporting columns are so placed as to allow no overhang at the end of the bed, and they are made wide so as to shorten the span of the bed between the columns. Saddle carrying cross slides to the post and apron is unusually heavy and generous in its measurements. It is 7 in. wide at the bridge and a 24½ in. bearing on the shears. Cross slide and compound slide are both provided with taper gibs to take up wear, and both screws for

this slide are indexed to read to .001 inch.

The apron is cast in one piece, and provides a double bearing to all gears.

The tailstock spindle is of the same material as the headstock spindle and



16-INCH LATHE FITTED WITH TURRET

accurately ground. Tailstock is clamped to the bed by means of a single heavy cast iron clamp operating the whole length of the tailstock, and secured by two bolts diagonally placed, which provides one of the best methods yet adopted for locking a tailstock. Tailstock casting is not split, but the spindle is locked by means of a clamping lever acting on double nuts, machined to fit perfectly to tailstock spindle.

The gear box for the quick change gears is very compact, requiring only two levers to obtain the thirty-two threads, ranging from three to forty-six per inch. Feeds, thirty-two in number, range from .0076 in. to .111 in. per revolution of spindle. All gears and shafts in the gear box are lubricated from but two oil cups, and there is no multiplicity of oil holes to become clogged with dirt. Gears are all steel machine cut. The gear box is so arranged that part of the box extends into the bed and projection beyond the front of the bed is reduced to a minimum, making a very compact drive. All shafts in the gear box are bronze bushed.

For lathes requiring turret, the tailstock, change gear box, apron and saddle are omitted, and the turret base, slide and turret are placed upon the bed. By means of suitable gearing the turret is connected positively to the spindle, and may be operated by power feed if desired. Change gears supplied with a machine thus equipped, allow four feeds, viz.: .010 in., .012 in., .015 in., .018 in. per revolution of spindle. To change to hand feed it is simply necessary to trip the power feed lever, dropping the worm out of mesh with the worm wheel. The diameter of the turret across the flat is 12 in. The bore for the tools is 2 in., and on each face four holes are tapped to secure special tool holders or other special equipment as desired. The turret head revolves upon a very large stud fitting it exactly, so that it is not necessary to use the clamping lever at each operation unless heavy cuts are being taken. The revolving head is of hexagon shape, giving better results for box tools. By forcing the turret slide back by means of the hand wheel the locking plunger is automatically released and the head revolved to the next station. The turret is self-indexing, the locking plunger being tool steel kept in line with taper gibs and seating itself in a hardened steel ring underneath the turret. The feed shaft is keywayed for 30 in. from the end, permitting the whole turret mechanism to be moved up close to the headstock if it is necessary to machine short work.

The equipment for the turret lathe consists of double friction countershaft, pump and piping and flexible hose with steel chip and drain pan, centre bushing and knock-out plug, and one No. 4 Morse taper centre and all necessary wrenches. (Chuck not included.)

Equipment for the regular engine lathe consists of double friction countershaft, tool post, 7 in. face plate, centre bushing and knock-out plug, pump, piping and flexible hose, steel chip pan, two No. 4 Morse taper centres, and necessary wrenches.

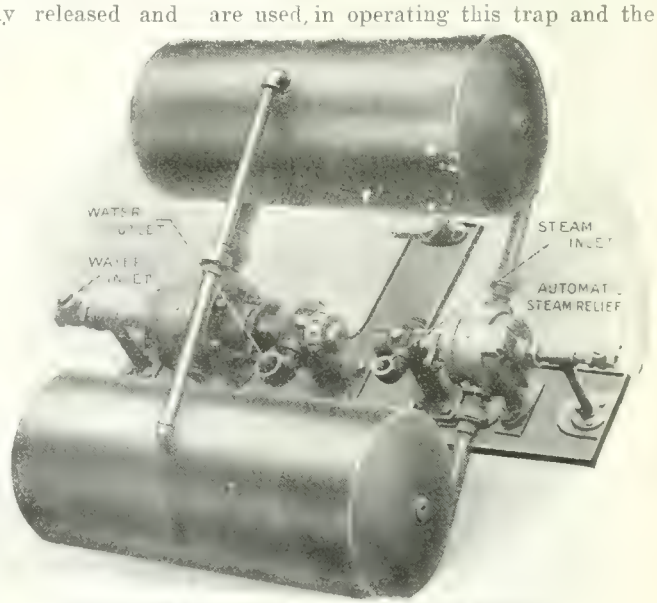
The principal specifications of this lathe, which is the product of the Oliver Machinery Co., Grand Rapids, Mich., are as follows:

Swing-over carriage .....$10\frac{1}{4}$ in.
Swing-over shears .....$17\frac{1}{2}$ in.
Length of bed .....7 ft. 2 in.
Distance between centres .....$38\frac{1}{2}$ in.
Front spindle bearing ....3 in. x 5 in.
Rear spindle bearing ..$2\frac{3}{8}$ in. x $3\frac{3}{4}$ in.
Tailstock spindle diameter.....$2\frac{1}{8}$ in.
Tailstock spindle travel.....6 in.
Hole through spindle .....1 5/16 in.
Countershaft pulleys.....12 in x 4 in.
Countershaft speeds ....180-220 r.p.m.
Weight on skids .....3,150 lbs. net.

DUPLEX STEAM TRAP

THIS Duplex Return Steam Trap is designed to fill all the requirements where a reliable and inexpensive method of handling condensation is necessary. It receives the water of condensation from whatever source and automatically delivers it into the boiler, or elevates it to a heater at practically the temperature corresponding to the pressure at which the steam is condensed.

Self-cleaning vaives of the sliding type are used. These are brass-lined and not liable to choke. The device feeds direct from the main or other source, discharging a continuous stream of are used, in operating this trap and the water to the boiler. No levers or weights whole arrangement is located entirely on the exterior of the boiler where all parts are easily accessible.



DUPLEX STEAM TRAP AND BOILER FEEDER.

When one tank is filling the other is emptying, the difference in weight of water in the drums operating the system.

The American Duplex Steam Trap Co. of Detroit, Mich., are the makers of this appliance.

The MacLean Publishing Company
LIMITED

(ESTABLISHED 1888)

JOHN BAYNE MACLEAN - - - - - - President
H. T. HUNTER - - - - - - - General Manager
H. V. TYRRELL - - - - - Asst. General Manager

PUBLISHERS OF

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

PETER BAIN, M.E., Editor.

Associate Editors,

A. G. WEBSTER, J. M. WILSON, J. H. RODGERS.

B. G. NEWTON - - - - - Advertising Manager

OFFICES:

CANADA—
Montreal—Rooms 701-702 Eastern Townships Bank Building, Telephone Main 1255
Toronto—143-153 University Ave. Telephone Main 7324.

UNITED STATES—
New York—R. B. Huestis, 115 Broadway. Phone 8971 Rector.
Chicago—A. H. Byrne, Room 607, 140 South Dearborn St. Telephone Randolph 3234
Boston—C. L. Morton, Room 733, Old South Bldg. Telephone Main 1024.

GREAT BRITAIN—
London The MacLean Company of Great Britain, Limited, 88 Fleet Street, E.C. E. J. Dodd, Director. Telephone Central 12960. Address: Atabek, London, England.

SUBSCRIPTION RATES:

Canada, $2.00; United States, $2.50; Great Britain, Australia and other Colonies, 8s. 6d. per year; other countries, $3.00. Advertising rates on request.

Subscribers who are not receiving their paper regularly will confer a favor by letting us know. We should be notified at once of any change in address, giving both old and new.

Vol. XIV. NOVEMBER 11, 1915 No. 20

PRINCIPAL CONTENTS.

The Manufacture of Galvanized Sheets in Canada 443-445

General 446
Copper in Alexandria—Labor Use of Portable Tools.

Presses for Manufacture of Shells and Shell Cases 447-450

General 450-451
1916 Foundry Exhibit at Cleveland—Economical Vanadium Iron Castings—Fly Cause of Ruptured Flywheels....Mill Construction....Australian Munitions Manufacture....Munitions Classes in Scotland....W. L. Hichens, Esq. (Portrait).

Progress in New Equipment 452-454
Wide Face Ring Wheel Grinder....16-Inch Heavy Duty Engine Lathe....Duplex Steam Trap.

Editorial 455
Development of Shell Making Opportunities

Selected Market Quotations 456-457

General Market Conditions and Tendencies 458-460

Industrial and Construction News (Advtg. Section) 42

DEVELOPMENT OF SHELL MAKING OPPORTUNITIES

THE certainty of a prolonged struggle in Europe has practically eliminated all uncertainty regarding developments in Canada's shell industry, and the net result is that we are now on the eve of embarking on the manufacture of types of shells in quantity, size and weight that not only easily surpass our present accomplishment, but call for equipment, methods, devices, attachments, and operative skill more diversified and more highly specialized than has yet been our privilege or opportunity.

The abnormal demand for machine tools and the myriad accessories incidental thereto shows little, if any, abatement so far as the manufacture of 3.3 shrapnel and 3.3 and 4.5 high explosive shells is concerned. In spite of this, and the fact that the placing of orders for these specialties will be continued without intermission and more or less indefinitely, contracts are being let for not only larger type shells, but for quantities of them that may easily rival the prolific production output of the above-mentioned small size projectiles.

Our editor has just returned from Ottawa, where he was privileged to meet Messrs. W. L. Hichens and R. H. Brand, who recently arrived from England to assume expert representation of the British Minister of Munitions on our Shell Committee.

Advantage was taken of the opportunity while in Ottawa to discuss a few features of the munitions situation in Canada and Great Britain at the present time, and relative to the easily unparalleled conditions that must necessarily be faced by both countries on conclusion of the war. The matter of ordnance manufacture in Canada also came under review.

Although but a few days in Canada, Messrs. Hichens and Brand had got well into harness, and, while the former was more or less a stranger in our midst, it was early apparent in the course of conversation that Mr. Brand was neither a stranger in the geographical sense of the word, nor in a business sense. Considering, however, the importance of the mission of the two gentlemen, it was by no means surprising that a widespread intimacy of men and things Canadian revealed itself.

Appreciation of the shell production of our metal-working plants, large and small, was expressed. Labor conditions were also touched upon, the employment of female labor on an extensive scale by munitions firms in Britain being referred to as the only solution there for the shortage of male labor, so far as maintenance and continuity of output was concerned.

Regarding the position of factories both here and in Great Britain when peace is declared, there was a tendency evident to presuppose a possibly brief but trying period during which the readjustments to peace conditions were being made. It was, however, anticipated that a gradual slowing down of munitions production would be operative through the better part of the succeeding twelve months, and that in the case of the specially-built and equipped "National" factories in Great Britain, these would be promptly closed down.

In the matter of the establishment of a Canadian ordnance factory, the consensus of opinion favored same, it being believed that, despite the lapse of time necessary to construct, equip and bring to the production stage such a plant, the venture would be worth while from the present war point of view, and would be an asset of considerable value to us against future war possibilities.

The addition to the personnel of Canada's Shell Committee of W. L. Hichens and R. H. Brand gives unmistakable proof of whole-hearted intention on the part of Britain's Munitions of War Minister to not only follow up the achievement of the Shell Committee formed by our Minister of Militia, but to strengthen, develop and broaden the scope by enlarging the opportunity of that body, and through it make our metal-working plants more patriotically and commercially effective.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$15 20
Lake Superior, charcoal, Chicago	16 75
Ferro Nickel pig iron (Soo)	25 00

	Montreal.	Toronto.
Middlesboro, No. 3	$24 00	.....
Carron, special	25 00	.....
Carron, soft	25 00	.....
Cleveland, No. 3	24 00	.....
Clarence, No. 3	24 50	.....
Glengarnock	28 00	.....
Summerlee, No. 1	30 00	.....
Summerlee, No. 3	29 00	.....
Michigan charcoal iron	28 00	.....
Victoria, No. 1	24 00	21 00
Victoria, No. 2X	23 00	21 00
Victoria, No. 2 plain	23 00	21 00
Hamilton, No. 1	23 00	21 00
Hamilton, No. 2	23 00	21 00

FINISHED IRON AND STEEL.

Per Pound to Large Buyers.	Cents.
Common bar iron, f.o.b., Toronto	2.35
Steel bars, f.o.b., Toronto	2.45
Common bar iron, f.o.b., Montreal	2.35
Steel bars, f.o.g., Montreal	2.45
Twisted reinforcing bars	2.35
Bessemer rails, heavy, at mill	1.25
Steel bars, Pittsburgh	1.60
Tank plates, Pittsburgh	1.60
Beams and angles, Pittsburgh	1.60
Steel hoops, Pittsburgh	1.75

F.O.B., Toronto Warehouse.	Cents.
Steel bars	2.40
Small shapes	2.65

Warehouse, Freight and Duty to Pay.	Cents.
Steel bars	2.25
Structural shapes	2.50
Plates	2.30

Freight, Pittsburgh to Toronto.

18.9 cents carload; 22.1 cents less carload.

BOILER PLATES.

	Montreal.	Toronto.
Plates, ¼ to ½ in., 100 lb.	$2 35	$2 35
Heads, per 100 lb.	2 60	2 60
Tank plates, 3-16 in.	2 70	2 70

OLD MATERIAL.

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$12 25	$12 25
Copper, crucible	14 25	14 00
Copper, unch-bled, heavy	14 25	13 50
Copper, wire, unch-bled	14 25	14 00
No. 1 machine compos'n	11 50	11 50
No. 1 compos'n turnings	10 25	10 00
No. 1 wrought iron	10 00	8 50
Heavy melting steel	8 50	8 50
No. 1 machin'y cast iron	13 50	12 50
New brass clippings	11 00	11 00
No. 1 brass turnings	9 00	9 00
Heavy lead	4 60	4 50
Tea lead	$ 3 75	$ 3 50
Scrap zinc	11 50	10 00

W. I. PIPE DISCOUNTS.

Following are Toronto jobbers' discounts on pipe in effect Aug. 27, 1915:

	Buttweld Black	Buttweld Gal.	Lapweld Black	Lapweld Gal.
Standard				
¼, ⅜ in.	63	38½	....	....
½ in.	68	47½	....	....
¾ to 1½ in.	73	52½	....	....
2 in	73	52½	69	48½
2½ to 4 in	73	52½	72	51½
4½, 5, 6 in.	....	....	70	49½
7, 8, 10 in.	....	....	67	44½
X Strong P. E.				
¼, ⅜ in.	56	38½	....	....
½ in.	63	45½	....	....
¾ to 1½ in.	67	49½	....	....
2, 2½, 3 in.	68	50½	....	....
2 in.	....	....	63	45½
2½ to 4 in.	....	....	63	48½
4½, 5, 6 in.	....	....	66	48½
7, 8 in.	....	....	59	39½
XX Strong P. E.				
½ to 2 in.	44	26½	....	....
2½ to 6 in.	....	....	43	25½
7 to 8 in.	....	....	40	20½
Genuine Wrot Iron.				
⅜ in.	57	32½	....	....
½ in.	62	41½	....	....
¾ to 1½ in.	67	46½	....	....
2 in.	67	46½	63	42½
2½, 3 in.	67	46½	66	45½
3½, 4 in.	....	....	66	45½
4½, 5, 6 in.	....	....	63	42½
7, 8 in.	....	....	60	37½

Wrought Nipples.	
4 in. and under	77½%
4½ in. and larger	72½%
4 in. and under, running thread	57½%
Standard Couplings.	
4 in. and under	60%
4½ in. and larger	40%

MILLED PRODUCTS

Sq. & Hex. Head Cap Screws	65 & 5%
Sq. Head Set Screws	70 & 5%
Rd. & Fil. Head Cap Screws	45%
Flat & But. Head Cap Screws	40%
Finished Nuts up to 1 in.	70%
Finished Nuts over 1 in. N.	70%
Semi-Fin. Nuts up to 1 in.	70%
Semi-Fin. Nuts over 1 in.	72%
Studs	65%

METALS.

	Montreal.	Toronto.
Lake copper, carload	$20 00	$19 50
Electrolytic copper	20 00	19 25
Castings, copper	19 25	19 00
Tin	38 00	40 00
Spelter	18 00	18 00
Lead	6 50	6 50
Antimony	35 00	35 00
Aluminum	60 00	60 00

Prices per 100 lbs.

BILLETS.

	Per Gross Ton
Bessemer, billets, Pittsburgh	$26 00
Open-hearth billets, Pittsburgh	28 00
Forging billets, Pittsburgh	45 00
Wire rods, Pittsburgh	33 00

NAILS AND SPIKES.

Standard steel wire nails, base	$2 60	$2 55
Cut nails	2 50	2 70
Miscellaneous wire nails	75 per cent.	
Pressed spikes, ⅝ diam., 100 lbs.	2 85	

BOLTS, NUTS AND SCREWS.

	Per Cent.
Coach and lag screws	70-10
Stove bolts	80
Plate washers	40
Machine bolts, ⅜ and less	65-10
Machine bolts, 7-16 and over	57½
Blank bolts	57½
Bolt ends	57½
Machine screws, iron, brass	35
Nuts, square, all sizes	4c per lb. off
Nuts, hexagon, all sizes	4½c per lb. off
Iron rivets	72½
Boiler rivets, base, ¾-in. and larger	$3.75
Structural rivets, as above	3.75
Wood screws, flathead, bright	85, 10, 7½, 10 p.c. off
Wood screws, flathead, Brass	75 p.c. off
Wood screws, flathead, Bronze	70 p.c. off

LIST PRICES OF W. I. PIPE.

Standard. Nom. Diam.	Price. per ft.	Extra Strong. Sizes Ins.	Price per ft.	D. Ex. Strong. Size Ins.	Price per ft.
⅛in	$ .05½	⅛in	$ .12	½	$ .32
¼in	.06	¼in	.07½	¾	.35
⅜in	.06	⅜in	.07½	1	.37
½in	.08½	½in	.11	1¼	.52½
¾in	.11½	¾in	.15	1½	.65
1 in	.17½	1 in	.22	2	.91
1¼in	.23½	1¼in	.30	2½	1.37
1½in	.27½	1½in	.36½	3	1.86
2 in	.37	2 in	.50½	3½	2.30
2½in	.58½	2½in	.77	4	2.76
3 in	.76½	3 in	1.03	4½	3.26
3½in	.92	3½in	1.25	5	3.86
4 in	1.09	4 in	1.50	6	5.32
4½in	1.27	4½in	1.80	7	6.35
5 in	1.48	5 in	2.08	8	7.25
6 in	1.92	6 in	2.86	....	....
7 in	2.38	7 in	3.81	....	.....
8 in	2.50	8 in	4.34	....	.....
8 in	2.88	9 in	4.90	....	.....
9 in	3.45	10 in	5.48	....	....
10 in	3.20	....	....	....	.....
10 in	3.50	....	....	....	.....
10 in	4.12	....	....	....	.....

COKE AND COAL.

Solvay Foundry Coke	$6.25
Connellsville Foundry Coke	5.65
Yough, Steam Lump Coal	3.83
Penn. Steam Lump Coal	3.63
Best Slack	2.99

Net ton f.o.b. Toronto.

COLD DRAWN STEEL SHAFTING.

At mill	35%
At warehouse	30%

Discounts off new list. Warehouse price at Montreal and Toronto.

MISCELLANEOUS.

Solder, half-and-half	0.23
Putty, 100-lb. drums	2.70
Red dry lead, 100-lb. kegs, per cwt.	9.65
Glue, French medal, per lb.	0.15
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.23
Benzine, single bbls., per gal.	0.25½
Pure turpentine, single bbls.	0.80
Linseed oil, raw, single bbls.	0.77
Linseed oil, boiled, single bbls.	0.80
Plaster of Paris, per bbl.	2.50
Plumbers' Oakum, per 100 lbs.	4.50
Lead Wool, per lb.	0.11
Pure Manila rope	0.16
Transmission rope, Manila	0.20
Drilling cables, Manila	0.17
Lard oil, per gal.	0.73
Union thread cutting oil	0.60
Imperial quenching oil	0.35

POLISHED DRILL ROD.

Discount off list, Montreal and Toronto 40%

PROOF COIL CHAIN.

¼ in.	$9.00
5-16 in.	5.90
⅜ in.	4.95
7-16 in.	4.65
½ in.	4.40
9-16 in.	4.05
⅝ in.	4.30
¾ in.	4.15
⅞ inch	3.65
1 inch	3.45

Above quotations are per 100 lbs.

TWIST DRILLS.

	%
Carbon up to 1½ in.	55
Carbon over 1½ in.	25
High Speed	
Blacksmith	55
Bit Stock	60 and 5
Centre Drill	20
Ratchet	20
Combined drill and c.t.s.k.	15

Discounts off standard list.

REAMERS.

	%
Hand	25
Shell	25
Bit Stock	25
Bridge	65
Taper Pin	25
Centre	25
Pipe Reamers	80

Discounts off standard list.

IRON PIPE FITTINGS.

Canadian malleable, A, 25 per cent.; B and C, 35 per cent.; cast iron, 60; standard bushings, 60 per cent.; headers, 60; flanged unions, 60; malleable bushings, 60; nipples, 75; malleable, lipped unions, 65.

TAPES.

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun., Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun., Steel Tape, 50 ft.	3.50

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$3 00	$2 85
Canada plates, dull, 52 sheets	3 15	3 15
Canada Plates, all bright	4 60	4 75
Apollo brand, 10¾ oz. galvanized	5 50	4 80
Queen's Head, 28 B.W.G.	6 00	5 95
Fleur-de-Lis, 28 B. W. G.	5 75	5 75
Gorbal's Best, No. 28	6 00	6 00
Viking metal, No. 28	5 25	5 25
Colborne Crown, No. 28	5 70	5 80
Premier No. 28	5 40	5 20

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$14 25	.....
1¼ in.	14 25	.....
1½ in.	14 25	.....
1¾ in.	14 25	.....
2 in.	14 25	9 25
2¼ in.	15 50	10 50
2½ in.	16 50	11 50
3 in.	21 00	12 25
3½ in.	24 00	14 50
4 in.	29 50	18 50

Prices per 100 feet, Montreal and Toronto.

WASTE.

WHITE.	Cents per lb.
XXX Extra	0 11½
X Grand	0 11
XLCR	0 10¼
X Empire	0 09½
X Press	0 08¾
COLORED.	
Lion	0 07¾
Standard	0 07
Popular	0 06¼
Keen	0 05½
WOOL PACKING.	
Arrow	0 17
Axle	0 12
Anvil	0 09
Anchor	0 07
WASHED WIPERS.	
Select White	0 08½
Mixed Colored	0 06¼
Dark Colored	0 05¼

This list subject to trade discount for quantity.

BELTING RUBBER.

Standard	50%
Best grades	30%

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and d'ble, 40 & 10%	
Standard	50%
Cut leather lacing, No. 1	$1.20
Leather in sides	1.10

ELECTRIC WELD COIL CHAIN B.B.

¼ in.	$12.75
3-16 in.	9.00
¼ in.	6.00
5-16 in.	4.75
⅜ in.	3.75
7-16 in.	3.75
½ in.	3.75
⅝ in.	3.60
¾ in.	3.60

Prices per 100 lbs.

PLATING CHEMICALS.

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.06
Acid, Nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.35
Ammonium sulphate	.07
Arsenic, white	.10
Copper sulphate	.10
Cobalt Sulphate	.50
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.50
Nickel sulphate	.15
Potassium carbonate	.40
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.04
Sodium cyanide, 127-130%	.35
Sodium hydrate	.04
Sodium hyposulphite (per 100 lbs.)	3.00
Sodium phosphate	.14
Tin chloride	.45
Zinc chloride	.20
Zinc sulphate	.07

Prices Per Lb. Unless Otherwise Stated.

ANODES.

Nickel	.47 to .52
Cobalt	1.75 to 2.00
Copper	.22 to .25
Tin	.45 to .50
Silver	.55 to .60
Zinc	.22 to .25

Prices Per Lb.

PLATING SUPPLIES.

Polishing wheels, felt	1.50 to 1.75
Polishing wheels, bullneck	.80
Emery in kegs	.4½ to .06
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.04 to .06
Emery composition	.05 to .07
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, Que., Nov. 8, 1915.—The general industrial situation still shows an encouraging tendency. While the bulk of the business is largely due to the filling of contracts for munitions and war supplies, considerable activity is being shown in other spheres of industrial enterprise.

Several plants, closely connected with shell-making in and around Montreal, are contemplating building additions to their present factories, or erecting new plants entirely to meet the requirements of the newly-placed orders. It is understood that the Canada Cement Company have commenced operations on a plant which, when completed, will be fully equipped with the necessary machinery for the production of 9.2 high explosive shells.

The successful harvesting of an unprecedented crop will go a long way to stimulate trade conditions in Canada. The transportation of the crop is expected to tax to the limit existing facilities and equipment, both on land and water.

Pig Iron

Reports from many sources show conditions steadily improving in the market for pig iron. For some time there was apparent the possibility of a shortage in the supply, due to the heavy demand for steel bars and billets. Production has, however, been well maintained, the pace set by the unprecedented output requirements of the steel mills notwithstanding. While advances fail to be noted in the quotations of foreign markets, local prices remain steady. Increased demand in the near future, due to the requirements of shell manufacturers, for the production of larger shells may cause a further advance and tend to create a scarcity.

If the production of pig iron becomes in excess of the quantity consumed, no serious inconvenience will be caused.

Steel

The exceptional situation in the iron and steel trade has a tendency to put the general markets somewhat out of balance. No definite prices can be obtained on many steel products, as many of the mills have withdrawn quotations. In numerous instances it is not a question of price, but of output, as the mills are full up with orders that will keep them busy at full capacity for a period of six months to a year or more. The advent of further orders for 3.3 and 4.5 shells and the placing of contracts for the larger high explosive shells will, of course, make the situation still more acute.

Purchasers of finished steel are having great difficulty in securing early delivery, and in some cases it is only the largest buyers that are getting any reasonable satisfaction on their manufacturing needs for 1916. Some concerns may find their future output seriously curtailed for lack of raw material.

Machine Tools and Supplies

Machine tool builders are having added responsibility placed upon them by the inquiries for equipment for the production of 5-in., 6-in., 8-in. and 9.2-in shells. No definite information is available as to the firms receiving orders for these munitions, but it is learned that several of the largest plants throughout the Eastern provinces have signed contracts for shell orders amounting to anywhere from $5,000,000 to $25,000,000. With the completion of the placing of these contracts and further orders for the smaller shells, the demand for tools is bound to tax the resources of machine tool makers to the utmost. The equipment necessary for the larger size shells will require very heavy machinery, and facilities for handling will require careful consideration on the part of the tool builder and the shell manufacturer.

The 9.2-in. and 8-in. shells, and even the 6-in. shells, will necessarily require different equipment than that being used for the smaller and lighter projectiles. Convenient and economic methods must be adopted for handling the heavy shells in and out of the different machines and transferring them from opeeration to operation. Chain blocks, air hoists and monorails or transfer trucks will be required, and means of holding the shells and driving them while being turned will call for special thought and consideration. Inquiries have been received by one dealer for 35 large projectile lathes for the manufacture of 9.2-in. shells.

ALLIES PURCHASING AGENTS

The Trade and Commerce Department, Ottawa, has published the following list of purchasing agents for military purposes for the allied Governments:

International Purchasing Commission, India House, Kingsway, London, Eng.

French.—Hudson Bay Co., 56 McGill Street, Montreal; Captain Lafoulloux, Hotel Brevort, New York; Direction de l'Intendence Ministere de la Guerre, Bordeaux, France; M. De la Chaume, 28 Broadway, Westminster, London.

Russian.—Messrs. S. Ruperti and Alexsieff, care Military Atache, Russian Embassy, Washington, D.C.

Metals

The general trend of the metal markets is to advance, and while quotations remain unchanged locally, there is a possibility of slight advances in some lines before the close of the present week. Lead will very likely be stronger. New York quotes the following advances:—Spelter, .75 cents; lead, .15 cents; tin, 2.32 cents, and antimony, 1.25 cents per pound.

Copper

Slight improvement is shown in the copper market, but owing to the comparatively poor showing of last month, producers are still in a position to supply the demand without noticeable advance in prices. Requirements of copper for shell orders now being placed may have some effect towards increasing prices.

Tin

While activity in the foreign markets appears brisk, the local situation is little changed from the previous week, and quotations are holding firm. An advance of 2.32 cents per lb. is shown on the New York market, due to the apparent scarcity of supply. Local dealers are quoting 38c per pound.

Spelter

A decline in the price of spelter is looked for in the near future. Producers are gradually increasing the supply over that of the demand, and prospects are that quotations on spelter will be lower than at present. Foreign demand has created an advance in the United States, but there is little to indicate what the ultimate condition of the market will be. The price is steady at 18 cents per lb.

Lead

Quotations on lead remain firm, and the situation is unchanged. However, local dealers expect an advance before the coming week. Present price, 6½ cents a lb.

Antimony

The market is quiet, but quotations remain firm, present price being 35 cents per lb.

Old Material

Business is quiet with dealers in old material. Inquiries for heavy melting steel and turnings have fallen off considerably. Prices remain unchanged.

with the exception of tea lead, which shows an advance of 25 cents per 100 lbs., and scrap zinc, which has risen to $11.50 per 100 lbs.

Toronto, Ont., Nov. 9.—The industrial situation continues favorable and there is an increase of confidence for the future in business circles. In addition to heavy increases in exports the Dominion revenue is steadily growing. The customs returns for October were about four million dollars more than for the corresponding month of 1914, while for the first seven months of the present fiscal year the revenues were seven millions more than for the corresponding period of last year. The high ocean freight rates at present prevailing are a serious handicap to ordinary trade other than war business. The rates which are very much higher than at normal times, add considerably to the cost of the product and so have a tendency to restrict business.

Developments in the shell industry are being followed with the greatest interest; this is to be expected, considering the large amount of money involved. Contracts for the 6-in., 8-in. and 9.2-in. shells are being allotted gradually, and it is pretty well understood who are the recipients, although the amounts and values have not been given out officially. A large number of tenders for shells and shell parts have been submitted and their consideration requires considerable time and attention. The reorganization of the Shell Committee will probably not take place until the awarding of the various contracts has been completed. Sir Frederick Donaldson has left for England, where he will report to the War Office as to conditions in Canada and the feasibility of establishing ordnance works here.

Steel Market

The most important development in the steel market this week and one which indicates the trend of business is the withdrawal of prices on steel bars. The mills have taken this action on account of the unsettled condition of the market due to the heavy demand for steel and the difficulty in promising delivery. The mills will until further notice quote on application only for prompt acceptance. Canadian steel companies have advanced steel bars 10c. to $2.45 per 100 lbs., which price is really nominal. Iron bars are unchanged at $2.35. Pittsburgh bars for Canadian consumption are quoted nominally at 1.50c, but higher prices are more general. The steel market is very active and the demand for steel for munitions is steadily increasing. The placing of orders for the large-calibre shells will mean a considerable increase in tonnage, and will tax the capacity of the mills. This business will be additional to the requirements for the 18-pdr. shells, which are still being produced in large quantities. The steel trade is in an exceedingly prosperous condition and the present activity will no doubt be a permanent benefit to the industry.

Prices of electric weld coil chain have been reduced, but in all probability will only be effective a short time. With a higher tendency on all steel products, chain cannot help but be effected. Proof coil chain, fire welded, is unchanged but an advance is looked for in the near future. Seamless boiler tubes are very firm at last week's advance and may go still higher. Prices of boiler plates have been readjusted in an upward direction. Galvanized sheets are strong, some brands having been advanced. The tendency is decidedly in an upward direction on account of the high prices of spelter, acid and black sheets. There is only a fair demand for galvanized sheets in Canada, although in the States there is a large volume of export business. Bessemer black sheets No. 28 gauge are being quoted at 2.10c to 2.20c; open hearth; No. 28, 2.20c to 2.24c, and blue annealed No. 10 at 1.70c to 1.80c, Pittsburgh. "Premier" galvanized sheets are now being quoted at $5.20 per 100 lb. Toronto.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the commission headquarters are at Ottawa.

The high-speed tool steel situation may fairly be said to be acute. The scarcity, especially under present conditions, is very serious and is causing considerable anxiety to makers of munitions. Although prices are advancing all the time, these ranging from $2.50 to $3.50 per lb., the makers are unable to promise either a definite delivery date or the amount specified. Stocks in Canada are very low and supplies are difficult to obtain from Sheffield, England, on account of the restrictions placed on exports of tool steel by the British Government because of the enormous demand and the necessity of conserving supplies. The heavy demand in the States also makes it exceedingly difficult to obtain supplies from the mills in that country.

The extraordinary demand in the States for steel, particularly for munitions, continues and the mills are overwhelmed with orders. The output is expanding rapidly and prices are steadily advancing. For domestic delivery all makers are quoting bars at 1.50c Pittsburgh, but export business is being booked at considerably higher figures. The heavy demand for billets continues and prices are still advancing. Bessemer billets are now being quoted at $26, open-hearth billets at $28, and forging billets range from $35 to $45 f.o.b. Pittsburgh.

Pig Iron

There is an increased demand for low-phosphorus pig iron and there appears to be some scarcity of this grade. It is reported that Canadian buyers are unable to satisfy their requirements, one interest being in the market for several thousand tons monthly. Foundry grades are in better demand, but the tonnage is comparatively light.

Machine Tools

Although it is understood that no contracts for the large shells have been signed up, a number of firms who are practically certain of getting some of the business are making preparations to this end. Enquiries have been sent out for heavy lathes, but few orders have actually been placed, although considerable activity is expected very shortly. The situation is interesting to local dealers, and also to the builders of suitable tools.

Supplies

The demand for machine shop supplies continues very active, and prices in some lines have advanced. An all-round advance in cotton and wool waste has been announced ranging from ¼c to 1c per pound according to quality, etc. The long expected advance in leather belting has materialized, the new discounts being 40 and 10 per cent. for extra heavy single and double, and 50 per cent. for standard quality. Prices of high-speed cutters are higher, and the list has been revised with extras added. Prices on high-speed twist drills are withdrawn and quotations made only for prompt acceptance. Benzine has advanced again, and is now quoted at 25½c per gallon in barrels. Gasoline is 3c higher and is quoted at 23c per gallon. There is practically no change in prices of linseed oil or turpentine, although the latter is subject to considerable fluctuation and ranges from 76c to 82c per gallon. Plumbers' oakum is a little higher, and is quoted at $4.50 per 100 lb.

Old Metals

The metal for scrap iron and steel is weaker, Canadian mills having covered their requirements meantime. No. 1 wrought iron and heavy melting steel are both lower, having dropped 50c a ton. Machinery cast iron is stronger and has advanced 50c per ton. The market

(Continued on page 46.)

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News.

Engineering

Niagara Falls, Ont.—W. P. Gonder is in the market for turning machinery to cost $1,000.

Woodstock, Ont.—W. Baird & Son will build a machine shop to cost $4,000.

London, Ont.—The Empire Brass Co. will build an addition to their plant, to cost $1,300.

Montreal, Que.—The Canadian Tube & Iron Co. is building a machine shop on St. Patrick street.

Niagara Falls, Ont.—J. E. Gardner is in the market for a 20 h.p. engine and boiler to operate a sawmill.

Montreal, Que.—A fire at the Canadian Steel Foundries plant on St. Patrick street did about $1,500 damage on Nov. 2.

Owen Sound, Ont.—The Canadian Malleable Iron Co. will equip its plant for the manufacture of 60-lb. high-explosive shells.

Owen Sound, Ont.—The Owen Sound Iron Works Co. will shortly install machinery in its plant to manufacture high-explosive shells.

Mount Brydges, Ont.—R. H. Bellamy, Box 134, will purchase material for the factory to be erected here for the Crow Automobile Co.

Eustis, Que.—The Eustis Mining Co. will extend their plant at a cost of $100,000. Loomis & Dakin Co., Montreal, are the contractors.

Victoria, B.C.—The Victoria Chemical Co. will commence shortly on the erection of an addition to its plant for the manufacture of war material.

Leamington, Ont.—The town council have decided to call for tenders for two 110 h.p. boilers for the waterworks. A new boiler house will be built.

Chatham, Ont.—J. D. Dort of Flint, Mich., is associated with Robert Gray of this city in a proposition to establish a factory here for building motor cars.

Toronto, Ont.—It is announced that the Canadian Tygard Engine, Ltd., has purchased the old Ontario House, 942 Kingston road, for a factory, where aeroplane and submarine engines may be manufactured.

Sherbrooke, Que. — The Canadian Ingersoll Rand Co. will build a new machine shop to cost $50,000. Anglins, Ltd., Montreal, are the general contractors.

Vancouver, B. C.—An Eastern firm with a rolling mill costing from $120,000 to $160,000, is looking for a location at the coast, according to City Industrial Commissioner Davison.

Renfrew, Ont.—The O'Brien Munitions, Ltd., are building a smokeless powder plant of a capacity of 35,000 pounds per day. The plant will be opened about the first of the year.

Collingwood, Ont. — The Imperial Steel and Wire Co. is reported to have contracted with the British War Office for a supply of munitions and special articles used in trench warfare, the contract price being close to $5,000,000.

Chatham, Ont.—A deal has been closed whereby the American Well Works Co., of Aurora, Ill., will purchase the old Defiance Iron Works plant in Chatham. The plant was turned over to the new owners for $12,000. They will manufacture waterworks equipment.

Toronto, Ont.—The Canadian Tygard Engine, Ltd., has concluded the purchase of a tract of land at the corner of Kingston road and Lawlor avenue, East Toronto. The present buildings are to be utilized as a factory to fill orders until other buildings can be added.

Electrical

Stratford, Ont.—The Hydro Commission may install more transformers as the existing units are carrying a capacity load.

Kingston, Ont.—B. R. Newton, of Arden, situated about 50 miles from here, has water power capable of developing 2,000 h.p. which it is suggested should be taken over by the city and a hydro electric system installed.

Owen Sound, Ont.—The high tension work at the hydro-electric sub-station here is almost finished, and the current from the Eugenia Falls power plant could be turned on in Owen Sound if necessary. The wires which bring the power from Eugenia into Owen Sound at 22,000 volts have all been connected with the transformers which step it down to 2,300 volts.

Niagara, Falls, Ont.—The ratepayers on Nov. 3, at a special election passed a by-law approving a contract with the Hydro-Electric Commission of Ontario. The by-law was carried by a majority of 48. Another by-law appropriating $14,000 for machinery for the municipal electric light plant was carried by a majority of two. The Hydro contract calls for a minimum of 2,000 horse-power at $11.50 per horse-power, with an additional $1 per horse-power for transmission, and the term is 30 years.

General Industrial

London, Ont.—H. T. Reason contemplates the erection of a factory for the manufacture of paper boxes.

Kingston, Ont.—The City Council may buy a combination motor-driven pump, chemical and hose truck.

Peterborough, Ont.—Fire damaged the plant and stock of the Canadian Chicle Co. on Nov. 1, to extent of $6,000.

Oshawa, Ont.—The council will appoint a town engineer and waterworks superintendent. Thos. Morris is town clerk.

Paris, Ont.—The Paris Wincey Mills Co. will build a factory to cost $30,000. P. H. Secord & Sons, Brantford, are the contractors.

Prescott, Ont.—The Newell Mfg. Co. of Ogdensburg, N.Y., manufacturers of hardware, propose establishing a plant here. A by-law will be submitted to the ratepayers on Nov. 15.

Montreal, Que.—The Canadian Consolidated Rubber Co., Notre Dame Street, are building an extension to their factory to cost $3,000. G. M. Martin & Co. are the general contractors.

Wingham, Ont.—A representative of an American Safe Manufacturing Co. was in town last week looking through the old chair factory with a view to buying. He was greatly impressed with the town.

Windsor, Ont.—The representative of a large New England firm was in Windsor recently seeking a location for a branch plant. The company is anxious to find a building with 15,000 to 20,000 square feet of floor space, preferring rented quarters for the present.

THE A. R. WILLIAMS MACHINERY CO. LTD.
ST. JOHN, N.B. TORONTO WINNIPEG VANCOUVER
Canada's Leading Machinery House

THREAD MILLING MACHINES

FOR HIGH EXPLOSIVE SHELLS

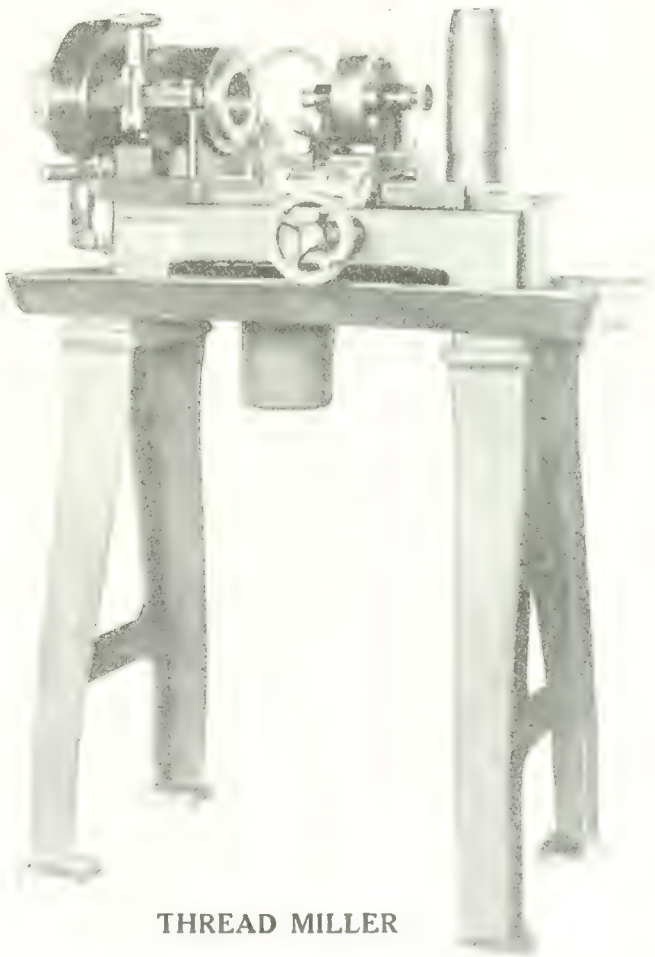
Patents applied for in Canada, United States, Great Britain, France, Russia and Italy.

The Holden-Morgan Thread Miller

Specially designed for Milling the Thread in the Base and Nose of High Explosive Shells.

Perfect threads are assured by the use of this machine. No rejections on account of stripped threads—so frequent when tapped by the old method.

New designs now ready for—6", 8" and 9.2" High Explosives.



THREAD MILLER

We have PLUG and SOCKET MILLERS to meet the requirements of the various types of SHELLS

ALL HOLDEN-MORGAN MACHINES ARE SIMPLE IN DESIGN, RIGIDLY BUILT, ECONOMICAL IN OPERATION, AND CAN BE OPERATED BY UNSKILLED LABOR

SALES AGENTS:

The A. R. Williams Machinery Company, Limited

Toronto, Canada

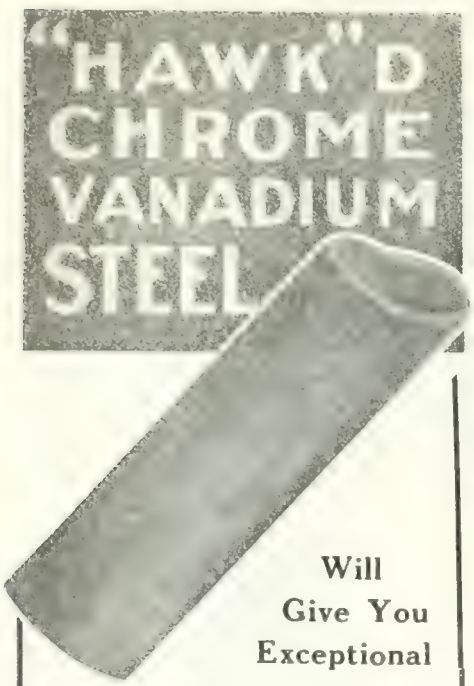
IF IT'S MACHINERY—WRITE "WILLIAMS"

Personal

City Engineer Mellis Ferguson, of St. Thomas, Ont., has applied to the Board of Water Commissioners for leave of absence in order that he may attend the school of military instruction at London, Ont.

W. J. Shaughnessy has been appointed a director of Canada Foundries and Forgings, Ltd., to fill the vacancy caused by the death of Robert Bowie, Brockville. Not long since Mr. Shaughnessy was appointed to the board of the West Kootenay Power and Light Company. He is one of the well known of the younger members of the Montreal Bar and a son of Sir Thomas Shaughnessy.

Sir Frederick Donaldson, head of the Woolwich Arsenal, who came to Canada last month with Lionel Hichens to inquire into the possibilities of ordnance manufacturing in Canada, has left for England. He will report to the War Office as to the conditions in Canada and the feasibility of establishing ordnance works in Canada which might be in a position to turn out big guns in time for use during the present war. It is understood that several of the big Canadian iron and steel firms are willing to go into the business, providing that sufficient orders are guaranteed to warrant the outlay for new machinery, and providing also that skilled workmen can be secured.



Will Give You Exceptional

Shell Forging Production

WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.

Comes to you heat-treated and ready for use.

It does not stick to the work.

There are many cases where each punch has turned out over 2,000 shells.

It means more shells, per machine per day.

STEEL OF EVERY DESCRIPTION.

Hawkridge Brothers Company

303 Congress St., BOSTON, MASS.

Trade Gossip

The Roelofson Elevator Co., Galt, Ont., have been awarded the contract for an elevator for the Seaman & Cohen Co.'s new factory at Kingston, Ont.

The Collingwood Shipbuilding Co., Collingwood, Ont., has been awarded a contract for a large steel freighter, similar in size to the J. G. Hagarty.

The Consolidated Mining & Smelting Co., Trail, B.C., have awarded a contract for the supply of several electric travelling cranes to the Northern Crane Works, Walkerville, Ont.

The Villeneuve Machine Gun Co., a corporate firm, with a capital of $99,000, has just been granted its letters patent for the manufacture and production of machine guns, cannon and firearms of all denominations. The company was incorporated at Quebec.

The Orillia Molybdenum Co., Orillia, Ont., has made its first shipment of two tons of concentrates of Molybdenite to the British War Office. This is the first time that this ore has been treated in Canada. The company has received instructions from the War Office to make weekly shipments for an indefinite period.

Heavy Guns Likely to Be Made Here. According to an Ottawa despatch, Montreal may shortly have an extensive industry in the manufacture of heavy guns and ordnance. J. H. Whitfield and M. J. Butler, of the Armstrong-Whitworth Corporation, whose extensive works are located on the South Shore, are now in Ottawa, and it is understood that the company is prepared to go into the manufacture of heavy guns and ordnance if orders are forthcoming.

Quebec Bridge Progressing.—The last connecting link in the north cantilever arm of the new Quebec Bridge was driven on Nov. 4, and the arm is now completed; in fact, the whole north side of the bridge is completed with the exception of a few bolts. The anchor arm of the south shore will be completed next week. The cantilever arm of the south shore will be completed next spring or summer, and the centre and final span will then be towed up and placed in position by next fall, it is anticipated, so that trains may be crossing the bridge before next winter.

PURO

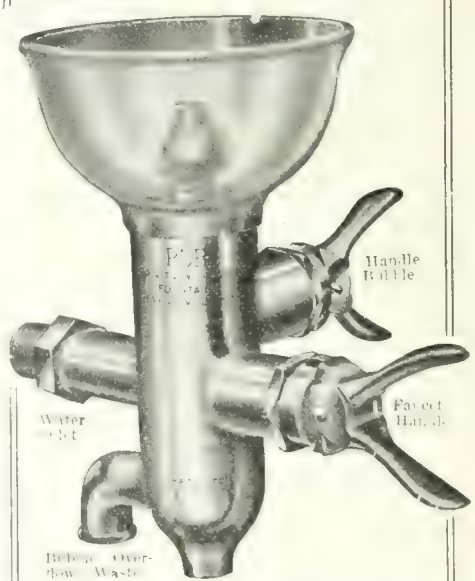
(MADE IN CANADA)

Saves Dollars

Why let that old-fashioned faucet go on year after year wasting water—MONEY?

Why make drinking cups and glasses, only to become unsanitary lost, broken or carried away?

Puro Sanitary Drinking Fountain stops all this needless waste. Puro saves you 95% on the water bill alone. Puro saves you all that money you spend for cups. YET Puro is always ready with a clean, cool drink with dollars in the bank.



Puro Pays for Itself

You don't have to wait years to get back the small investment you have tied up in Puro equipment—

You start saving right away—not only on your water bill saving, but on the increased efficiency [illegible] is well.

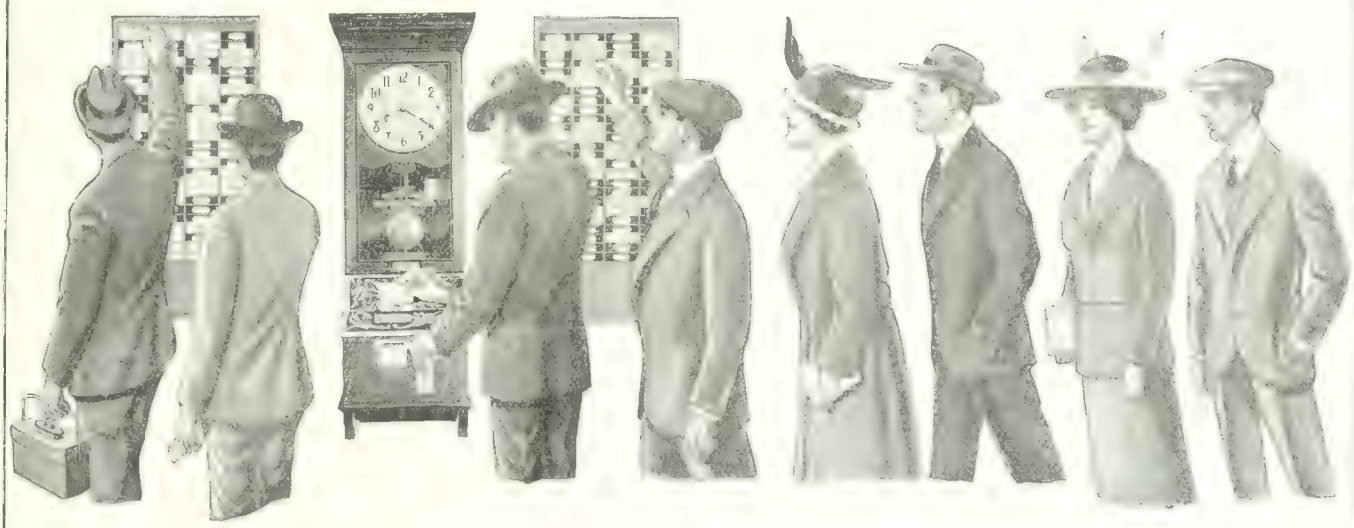
Many PURO users claim No danger of [illegible] drinking at the sparkling bubble. We can tell how many men, how many dollars and well [illegible] how much the [illegible]

"PURO-FY"

YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company

147 University Ave., TORONTO, CAN.



Who Do These People Work For?

Any one of the following firms—all are users of the International Time Recording Co. Systems:

Acton Publishing Company
Aikenhead Hardware Co.
Autosales Gum & Chocolate Co.
A. A. Allan Limited
W. H. Banfield & Son
Beal Bros.
Beardmore & Co.
Blackhall & Co.
Boake Manufacturing Co.
S. F. Bowser Company
British American Oil Co.
Brigdens Limited
Brown Bros.
F. N. Burt Co.
Canadian Carpet Co.
Canadian Fairbanks-Morse Co.
Canadian General Electric Co.
Canadian Kodak Company
Dominion Radiator
R. G. Dun
Dunlop Tire & Rubber Co.
T Eaton Co.
Eby Blain
H. P. Eckardt Co.
Firstbrook Box Co.
Flett, Lowndes Co.
E. W. Gillett Co.
Abitibi Power & Paper Co.
Goodyear Tire & Rubber Co.
Gourlay, Winter & Leeming
Geo. Hees & Son
Heintzman & Co.
Canadian Rumley Company
City Dairy
Confederation Life Association
Consumers' Gas Co.
Copeland, Chatterson Co.
Canadian Pacific Railway Co.
Canadian Rolling Mills Limited
Canadian Steel Foundries
Canada Carbide Co.
Canada Cement
Canada Sugar Refining Co.
Dominion Guarantee
Dominion Iron & Steel Co.
Ford Motor Company
Hudson Bay Knitting Co.
Ideal Bedding Co.
W. R. Johnston Co.
Julian Sales Leather Co.
Ambrose Kent & Sons
Massey-Harris Co.
Mathews, Blackwell Co.
Methodist Book Room
MacDonald Manufacturing Co.
McLaughlin Carriage Co.
McLean Publishing Co.
Nasmith Co.
Ontario Wind Engine Co.
Russell Motor Car Co.
Salada Tea
Saturday Night
Toronto Carpet Co.
Toronto Electric Light
Toronto Street Railway
Toronto Type Foundry
Turnbull Elevator Co.
A. R. Williams Machinery
Alaska Feather & Down Co.
Ames, Holden, McCready Co.
Canadian Car & Foundry

There is only one reason why these firms use the International Time Recording Systems; it costs many times more to be without it than it costs to buy it.

Our product is the result of 30 years' experience and the best money can produce. The International Time Recording Company sells 90% of all the time recording systems sold throughout the world; the cause of which is merit.

The term "fully automatic Time Recorder" means what it says, it is fully automatic. The employee never has any cause to touch the mechanism, other than to simply insert his time card.

International Time Recording Company of Canada, Limited

Ryrie Bldg., Corner Shuter and Yonge Sts., TORONTO

F. E. MUTTON,
General Manager

Montreal Representative: CHARLES COLE
Cartier Bldg., McGill and Notre Dame Sts., Montreal, Que.

CLASSIFIED ADVERTISEMENTS

¶ If you want to sell or buy a second-hand lathe, planer or any other shop equipment, let "CANADIAN MACHINERY" pick out a seller or buyer for you. How about that second-hand engine or boiler which you would like to dispose of?

Rates (payable in advance): 2c per word first insertion, 1c per word subsequent insertion. 5c additional each insertion when Box Number is required. Each figure counts as one word.

FOR SALE

FOR SALE NEW HAVEN SIXTY INCH face plate Lathe fifteen foot bed, complete with countershaft, steady rest, etc. Excellent tool for boring and nosing shells. Cost thirty-five hundred—will take two thousand. Bancroft Lathe, ten inch swing, 5 ft. bed, screw cutting, good condition, $125. Winnipeg Machinery Exchange, Winnipeg (21)

FOR SALE

FOR SALE—GAS ENGINE, 22 H.P., WITH Magneto, Battery, Water Tank, Gasometer, Muffler and 26" Clutch Pulley, cheap. This engine was used four months during the erection of our plant. The same is equipped for natural gas, but can be changed and used with gasoline at very reasonable expense. Well-known United States engine. Original cost, $600.00, besides the duty. Address H. Mueller Mfg. Co., Ltd., Sarnia, Ont. (21)

FOR SALE ELECTRIC PASSENGER AND freight elevator plant. Patterns—Drawings—Blueprints special and ordinary machinery and stock. This is a splendid business—few competitors. We offer a decided bargain. Winnipeg Machinery Exchange, Winnipeg. (21)

FOR SALE RICHARDS INDICATOR, COMplete, with attachments, nearly new, in perfect order. Apply Canadian Machinery, 143 University Ave., Toronto.

Sell Your Scrap Materials Direct to the Wholesaler

Get our quotations before selling. We are wholesale dealers in all grades of Scrap Iron, Shafting turnings and borings, Scrap Copper, Brass, etc. This week we are paying 20 cents per pound for Scrap Aluminum.

Send for our monthly price list. Our Motto, "Honest dealings and prompt settlements."

L. S. Tarshis & Son
88-92 Wellington St., Montreal

FOR SALE

16 Engine Lathes
18-in. to 42-in. Swing

American Machinery Exchange
217 Centre St., New York City

MORTON MANUFACTURING CO
PORTABLE PLANER
DRAW CUT SHAPERS
SPECIAL DRAW CUT R R SHAPERS
FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
MUSKEGON HEIGHTS U.S.A.

Tenders

Toronto, Ont.—Tenders for lead covered cable, addressed to the chairman of the Toronto Electric Commissioners, will be received until Tuesday, November 16, 1915. Specifications and form of tender can be obtained at the office of the purchasing agent, 15 Wilton Avenue.

Toronto, Ont.—The Toronto Electric Commissioners will be glad to receive tenders for overhead line construction work. Particulars may be obtained on application to the Purchasing or Engineering Departments, 15 Wilton Ave.

Ottawa, Ont.—Tenders will be received up to Tuesday, November the 23rd, for the undermentioned items for delivery to H.M.C. Dockyards at Halifax, N.S., and Esquimalt, B.C.: Steel and iron bolts, nuts and rivets, electric cable and wire, mineral grease, castile soap, hard soap, turpentine, chemicals, cleansing powder, bunting. Forms of tender and all information may be obtained by application to the Naval Store officer at H.M.C. Dockyards at Halifax, N.S., or Esquimalt, B.C., or to G. J. Desbarats, Deputy Minister of the Naval Service, Ottawa.

Municipal

Mimico, Ont.—A site comprising 7 acres has been purchased for the proposed sewage disposal plant.

Niagara Falls, Ont.—A test by-law on the question of establishing a municipal bakery was lost by a vote of two to one, on Nov. 3.

Toronto, Ont.—Plans have been approved by the Board of Control for the proposed incinerator building on the river Don. The structure will cost $150,000.

Tilbury, Ont.—The request of the Brantford Gas Co. to be allowed to lay three gas mains to supply the manufacturers with Tilbury unpurified gas has been granted by the city council.

Edmonton, Alta.—An agreement has been drawn up between the city and the Edmonton Power Co. whereby the latter guarantee to spend $7,500,000 in five years in and about the city to carry out the terms of the contract.

Halifax, N.S.—The Board of Control have adopted the following report of Controller Harris, on the application of the Imperial Oil Co., for property at Africville, and recommend that the city council pass it. The company will probably spend $250,000 on buildings and plant.

Rumely-Wachs Machinery Co.
121 N. JEFFERSON ST.
CHICAGO ILLINOIS

A Few of Our Second-Hand Tools in Stock for Immediate Delivery:

AUTOMATIC SCREW MACHINES

Brown & Sharpe No. 2, 5/8" capacity, automatics (19 of these).
Cleveland, 5/8", friction jigger (3 of these).
Cleveland 1", ratchet jigger.
Cleveland 1½", ratchet jigger.
Cleveland, 2".
National Acme 3/8", 4-spindle (4 of these).
National Acme ½".
National Acme ¾".
National Acme 7/8".
Levigne 5/8" (4 of these).
Pratt & Whitney ¾".

LATHES

14" x 4½' Putnam
14" x 6' LeBlond
16" x 8' Flather
18" x 8' Bradford
18" x 6' Blaisdell
18" x 10' Schumacher & Boye
20" x 10' Fifield
20" x 10' Bogert
20" x 10' Fish, gap
24" x 8' Putnam
36" x 16' Fifield

PLANERS AND SHAPERS

36" x 36" x 8' Fitchburg
36" x 35" x 15' Powell
14" Gould & Eberhardt, crank
15" Hendey, tool room
16" Stockbridge, crank, P.D.F.
20" Smith & Mills, b.g., crank
21" Averbeck, b.g., crank
26" Walcott, shifting belt

DRILL PRESSES

20" Miscellaneous makes (20)
21" Cincinnati (2)
26" Sibley & Ware
28" Barnes
28" Sibley & Ware
31" Barnes
Barnes No. 1, horizontal
Avey 2-spindle ball-bearing
Prentice 5' Plain Radial

MILLING MACHINES

No. 2 Fox, hand
No. 3 Fox, hand and power
No. 1 Brown & Sharpe
No. 4 Newton
No. 4 Brown & Sharpe, universal
No. 7 Becker, Lincoln
No. 1 Warner & Swasey Die Sinker
No. 2 Warner & Swasey Die Sinker
No. 2 Pratt & Whitney Die Sinker

PRESSES

Bliss No. 18 o.b.i.
Bliss No. 19 o.b.i.
Bliss No. 42 o.b.i.
Rockford No. 2 o.b.i.
American Can No. 3 o.b.i.
Walsh No. 4 o.b.i.
American Can No. 4½ o.b.i.
Bauroth No. 5 o.b.i.
Bliss No. 69-N Double Acting
Adriance No 12-A Double Acting
Toledo No. 14 Horning
Toledo No. 94-A Double Crank

MISCELLANEOUS

Landis 12 x 42" Plain Grinder
Gisholt Universal Tool Room Grinder
Gisholt 24" Turret Chucking Lathe
Acme 1½" Bolt Cutter
Acme 2½" Bolt Cutter
No. 2 and No. 3 M & M Keyseater
No. 5 Baker Keyseater, with rotary table

The Hepburn Single Purpose Heavy Duty Shell Turning Lathe

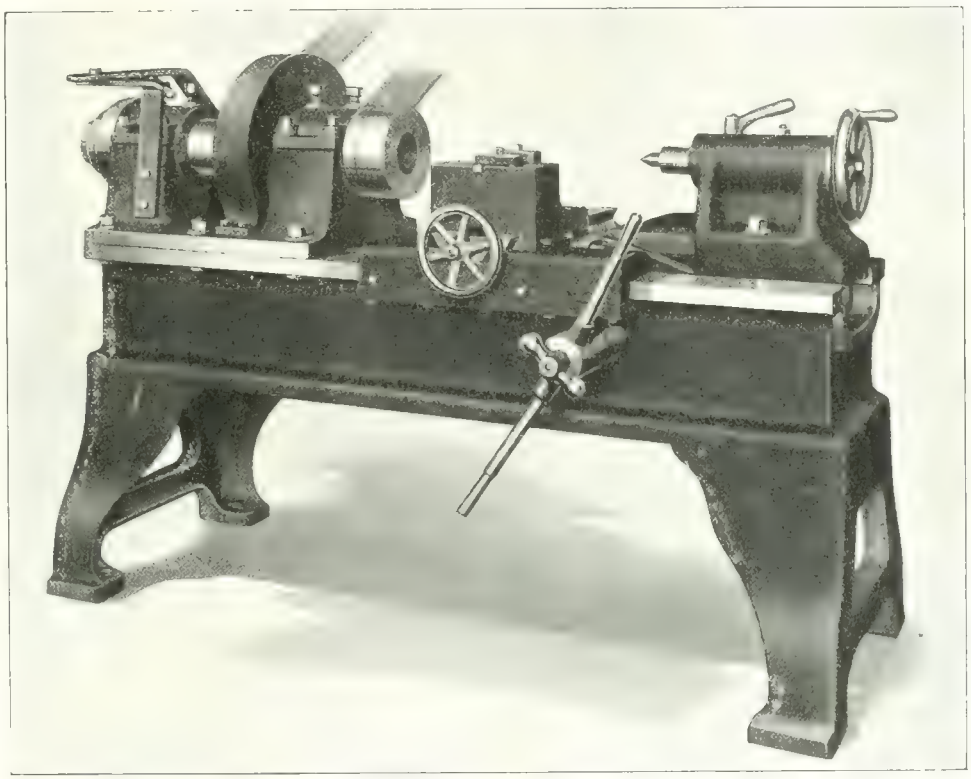
SPEED

ACCURACY

POWER

STRENGTH

SIMPLICITY



SHIPPING WEIGHT 3800 LBS.

SPECIFICATIONS

Diameter of Spindle, front bearing ..... $6\frac{1}{2}$" x $7\frac{1}{2}$"
Diameter of Spindle, back bearing ..... $5\frac{3}{4}$" x $7\frac{1}{2}$"
Hole through Spindle ..... $3\frac{3}{4}$"
Ball-bearing thrust on front of front bearing of spindle
Swing over Bed ..... 18"
Bed 7 feet 6 in. long by 1 foot $7\frac{1}{2}$ in. wide, flatways, giving $5\frac{3}{8}$ in. bearings on each side.
Ratio of Gearing, 5 to 1.
Travel of Tailstock Spindle ..... 8"
Three Feed Speeds ..... 1 32", 1 16" and $\frac{1}{8}$"
Cone Friction Drive Pulley, $13\frac{1}{2}$" diameter and 8" face for driving direct from line shaft.

Will supply countershaft and tight pulley on Lathe, if desired.

All work from Castings to completion Done in our own plant, insuring uniform quality throughout and PROMPT DELIVERY

JOHN T. HEPBURN, LIMITED

18-60 Van Horne Street, TORONTO

FIRE BRICK

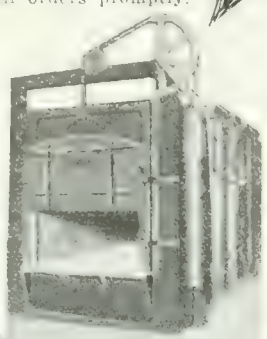
For Heat-Treating Furnaces, etc.

USING ELK FIRE BRICK IN LINING HEAT - TREATING FURNACES IS ANOTHER WAY OF ADDING TO THEIR EFFICIENCY, ECONOMY AND DURABILITY.

We carry in stock a large variety of shapes and sizes

Write for catalog.

We can fill all orders promptly.



The Elk Fire Brick Co. of Canada, Ltd.

Federal Life Building, Hamilton, Ontario

METAL STAMPINGS

We are manufacturers of stamped parts for other manufacturers.

We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

W. H. BANFIELD & SONS

372 Pape Avenue Toronto

TORONTO MARKETS

(Continued from page 459.)

for scrap copper, brass, zinc, and lead is reasonably active. The United States market is said to be over supplied and a reaction may be expected. Quotations on the above-mentioned metals are unchanged with the exception of zinc, which has advanced, and is quoted at 10c per pound.

Metals

The general situation in the metal market is much the same as last week. The upward movement in tin continues and lead has also advanced slightly. There is no change in the copper market, but the position of this metal is a good one, and higher prices are more likely than otherwise. The spelter market is much firmer and indications point to higher prices in the near future. There is nothing of particular importance to note with regard to antimony and aluminum, except that supplies of the last-named metal are practically unobtainable. Solders are firmer and higher prices may develop shortly.

Tin.—Considerable activity has developed in the tin market and the upward movement continues. The market is in a sound position, but there is a possibility of a revival in speculation. Tin has advanced 1c and is quoted at 40c per pound.

Copper.—The market is steady and firm. Production is going on at a rapid rate, but at the same time consumption exceeds the output. The position of this metal is a strong one, as consumption will increase rather than decrease. Local quotations are firm at 19½c per pound.

Spelter.—The market is firm with a higher tendency. There is an improvement in demand in New York, both domestic and export. Spelter has advanced ½c, and is quoted locally at 18c per pound.

Lead.—The New York market is firm at the "Trust" price which is 5c per pound, while the London market has also advanced. The advance is attributed to increased demand. Lead has advanced ½c and is now quoted at 6½c per pound.

Antimony.—The market is fairly active, but the general situation is unchanged. Antimony is quoted locally at 35c per pound.

Aluminum.—The situation is unchanged and supplies locally are almost unobtainable. Quotations are nominal at 60c per pound.

IT IS NOT the stockholders, the president or the claim agent who is getting hurt. It is the man on the job. For that reason, progressive companies are nowadays equipped with safety plans, safety devices and a safety organization.

PATENTS

W. T. Cuffe-Quin

Patent Solicitor and Expert
Registered Patent Attorney, U.S. 9187
Fellow Surveyors Institute, London, England.
47 Central Chambers, Elgin Street,
OTTAWA, CANADA (Near Govt. Patent Office)
Associate work for the Legal Profession before the Government Patent Office, a specialty
Cable address "Cquin Ottawa"

PATENTS

FETHERSTONHAUGH & CO.
"THE OLD ESTABLISHED FIRM"
5 ELGIN ST OTTAWA
ROYAL BANK BLG TORONTO
SEND FOR PLAIN PRACTICAL POINTERS & COPY NATIONAL PROGRESS IN WHICH ALL OUR PATENTS ARE ADVERTISED

PATENTS TRADEMARKS AND DESIGNS

PROCURED IN ALL COUNTRIES

Special Attention given to Patent Litigation

Pamphlet sent free on application.

RIDOUT & MAYBEE 59 Yonge Street
TORONTO

PATENTS PROMPTLY SECURED

In all countries. Ask for our Inventor's Adviser, which will be sent free.

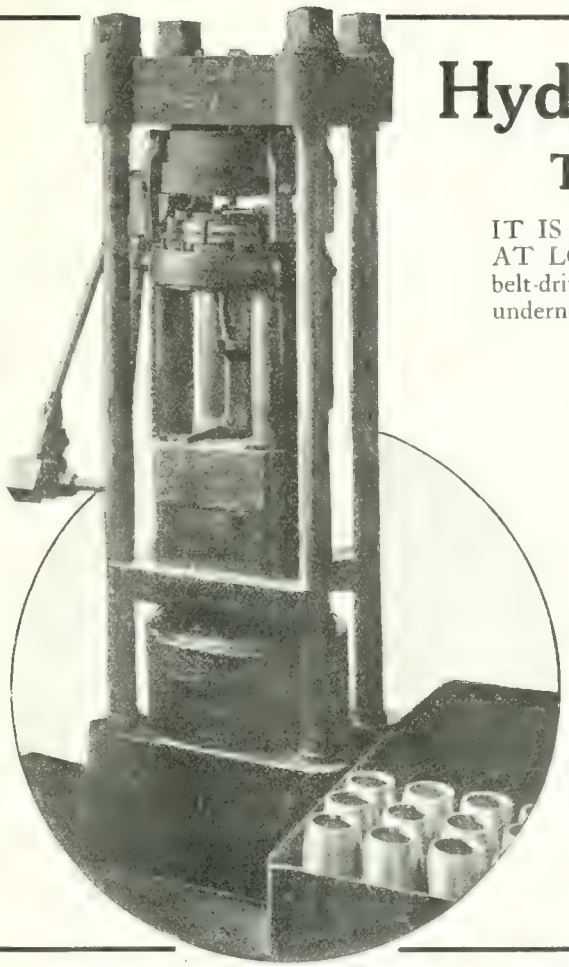
MARION & MARION, 364 University St.

Merchants Bank Building, corner St. Catherine St., MONTREAL, Phone Up. 6474 and Washington, D.C., U.S.A.

CAMBRIA STEEL BARS

We make a specialty of high-grade Bars. High Carbon, Smooth Finish, also regular Machinery Steel.

A. C. LESLIE & CO.
LIMITED
MONTREAL



Hydraulic Banding Press

That Enlarges Shell Output

IT IS A STRONG, SIMPLE AND RELIABLE MACHINE AT LOW COST. Power is obtained from continuous running belt-driven pump located near the press and is applied to the ram underneath the table.

TABLE RISES AND FORCES STEEL TAPER WEDGES, EIGHT IN NUMBER, UP INTO THE HOLLOW STEEL FORGING AT THE TOP. THE WEDGES CONFORMING TO THE SHAPE OF THE COPPER BAND ARE THUS PRESSED IN EQUALLY AGAINST SAME. PRESSURE IS THEN RELEASED AND THE SHELL READILY TAKEN OUT.

Operates by lever shown on left-hand side.

Pressure gauge behind.

As this machine is a Standard Hydraulic Press, it can be used in any other capacity.

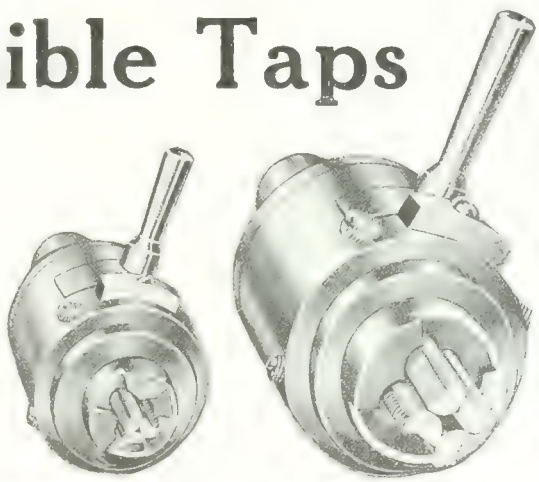
We also manufacture **LOADING FUNNELS, BALL-BEARING TIGHTENING NUTS, BELT-DRIVEN LOADING VIBRATORS, BENCH VISES,** and a universally endorsed BALL-BEARING ELEVATING TRUCK.

We shall be pleased to submit prices and give any particulars required.

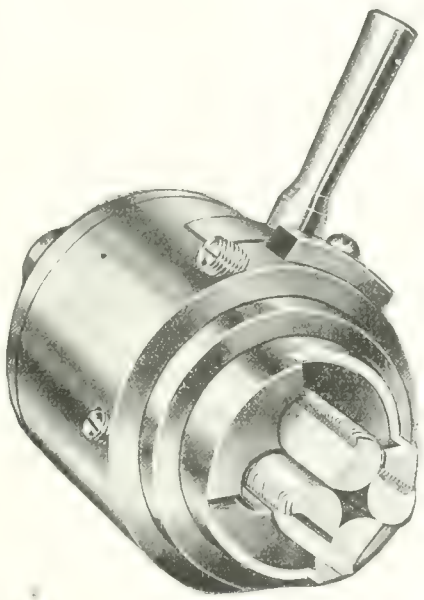
The Chapman Double Ball Bearing Co.
OF CANADA, LIMITED
339-351 Sorauren Ave., TORONTO, CANADA
Transmission Ball Bearing Co. Inc., 1407 West Ave., Buffalo, N.Y.

M. E. C. Collapsible Taps

are the choice of many manufacturers of Shrapnel Shell Parts



—And they have made a record for themselves on this work.



Ask the user, and profit by his experience. We gladly send you a list of our customers.

We have a very liberal proposition to offer you at this time. Let us get acquainted—you will find it a very profitable connection. Write us now.

Manufacturers Equipment Company
175-179 North Jefferson Street, CHICAGO

IMMEDIATE DELIVERY

We always carry a large stock of machine tools for general manufacturing purposes, and solicit inquiries requiring prompt delivery.

We call attention to the following, on which we will quote attractive prices. All in thoroughly first-class condition:

One—10' Betts, 72' Niles and King vertical boring mills, with two heads.
Two—36" Brown and Sharpe turret head vertical boring mills.
One—No. 4 Perkins heavy punch and shear, 30" throat, capacity 1" hole through 1" plate.
One—40" x 40" x 12' New Haven planer, with one head.
Three—5' Bickford and Prentice radial drills.
One—36" Cincinnati radial drill, B.G. with reverse belt or motor drive.
Two—36" Snyder upright drills, power feed, etc., heavy duty.
One—24" American turret machine, 2½" hole through spindle.
One—18" Cincinnati double head shaper, with two tables on 12' bed.
One—17" x 8" Bullard & Smith slab miller, with two hor. spindles.
One—No. 14 Gardner disc grinder.
One—600-lbs. Bement steam drop hammer, 6½" diam., 30 stroke.
One—30" x 27' Pond engine lathe, C.P.R. and change gears.
One—30" x 16' New Haven lathe, C.P.R. and change gears.
One—24" x 12' New Haven lathe, C.P.R. and change gears.

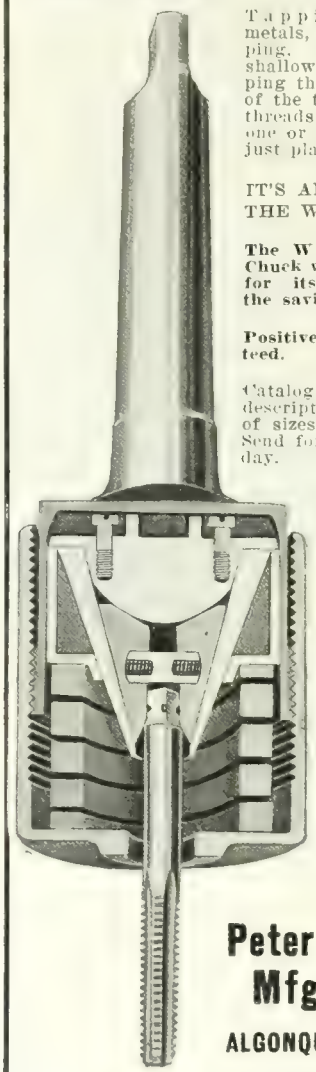
Girard Machine and Tool Co.

491-493 N. Third Street, Philadelphia, Pa.

The *Woodstock Chuck*

ELIMINATES TAP BREAKAGE

Because the chuck automatically releases the instant the tap binds or reaches the bottom of the hole.



Tapping tough metals, blind tapping, tapping in shallow holes, tapping the full length of the tap or where threads are only one or two deep, or just plain tapping.

IT'S ALL ONE TO THE WOODSTOCK

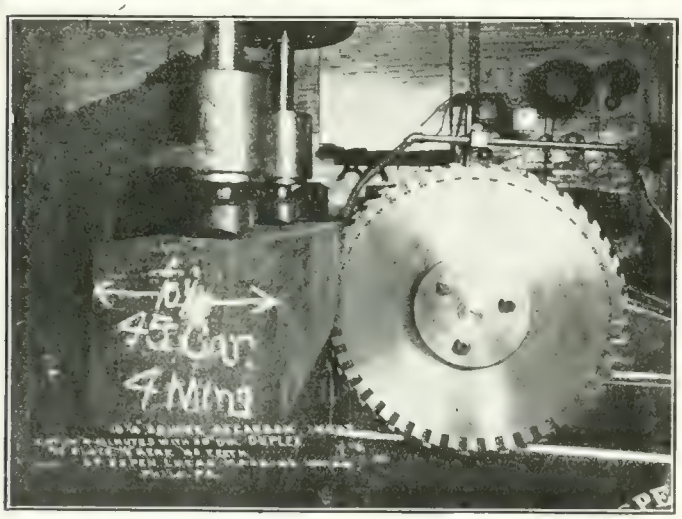
The Woodstock Chuck will soon pay for itself through the saving in taps.

Positively guaranteed.

Catalog gives full description, range of sizes and prices. Send for a copy today.

Peter Bros. Mfg. Co.

ALGONQUIN, ILL.



Circular Metal Cutting Saw Blades for Any Type of Machine

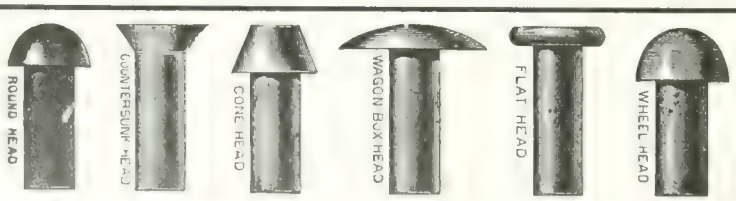
Let us demonstrate what a saving can be made by installing a

HUNTER "DUPLEX" Inserted Tooth Blade

Write for information

HUNTER SAW & MACHINE CO., Pittsburgh, Pa., U.S.A.

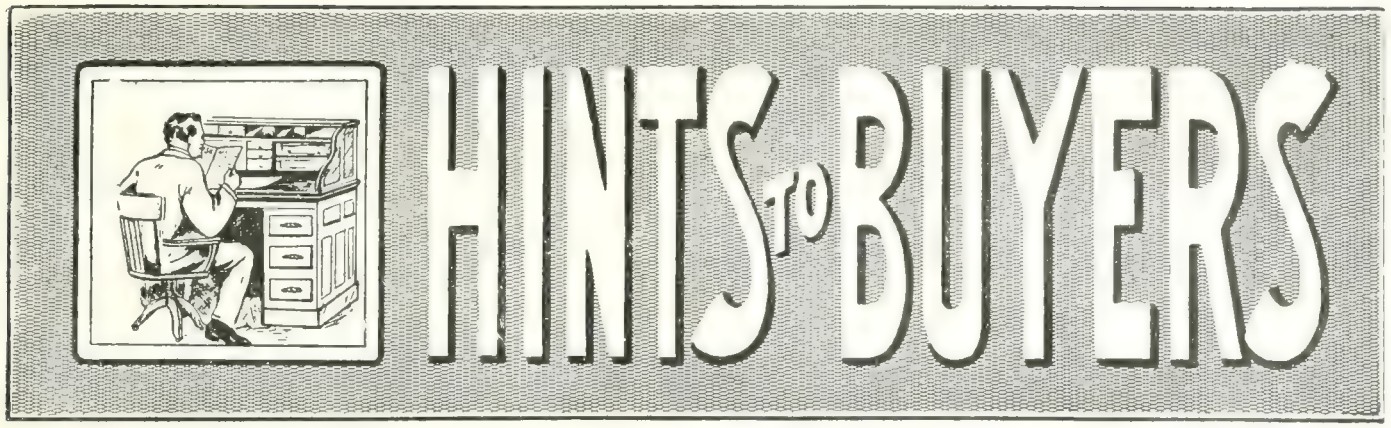
A want ad. in this paper will bring replies from all parts of Canada.



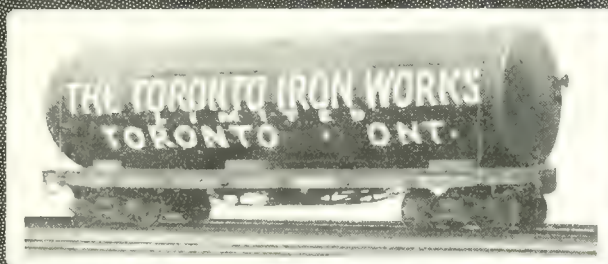
WE MANUFACTURE RIVETS of every description, ½ inch. dia. and smaller.

PARMENTER & BULLOCH CO., LTD.

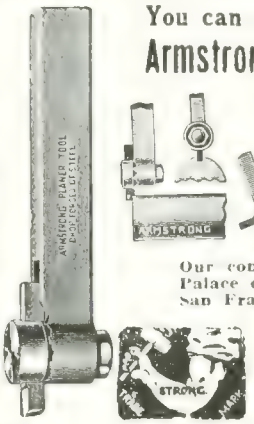
GANANOQUE, ONT.



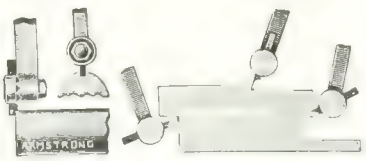
RIVETED STEEL TANKS FOR EVERY PURPOSE



OIL STORAGE – GASOLINE TANKS – AIR RECEIVERS
PNEUMATIC WATER SUPPLY TANKS – SMOKE STACKS
BOILER BREECHING – RIVETED STEEL PIPE, BINS & HOPPERS



You can afford to use High-Speed Steel in
Armstrong Planer and Shaper Tools



They require no forging, Minimum of Grinding and Mighty Little Tool Steel.

Our complete line is on exhibition in Block 41, Palace of Machinery, Panama-Pacific Exposition, San Francisco.

Catalog sent for the asking.

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
306 N. Francisco, Chicago U.S.A.

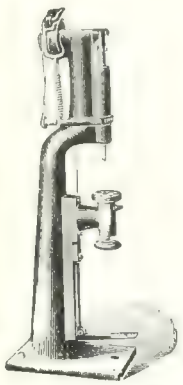
Genuine Armstrong Stocks and Dies
Hinged Pipe Vises.
Pipe Cutters. Steam and Gas Fitters' Tools.
Pipe Machines for Threading Pipe.
Either Hand or Power.

Manufactured by
THE ARMSTRONG M'F'G CO.
328 KNOWLTON ST. BRIDGEPORT, CONN.
NEW YORK, 248 CANAL ST.

Gives Satisfaction Where Other Metals Fail

Sold by Leading Dealers Everywhere, or by

MAGNOLIA METAL CO.
Office and Factory:
225 St. Ambroise St., Montreal



IS YOUR RIVETING PROFITABLY DONE?

Our Elastic Rotary Blow Riveting Machine does profitable work, because one machine will do the work of several hand riveters, and do it better.

Every head is perfectly formed, any shape, round, flat, oval, rectangular, etc.

Catalogue C tells more about it.

The F. B. SHUSTER COMPANY
New Haven, Conn.
Formerly John Adt & Son. Established 1866

Also makers of Wire Straighteners and Cutter, Cotter Pin Machines, etc.

THE DUPONT
Patent
Power Hammer

BEST FOR Durability, Economy of Power, Simplicity of Adjustment.

Seven Sizes
from 35 to 300 lbs

Only High Class Material Used and Satisfaction Guaranteed.

ASK FOR CATALOGUE.
SENT FREE

ThePLESSISVILLE FOUNDRY
Plessisville, Que

Ontario and Western Agents:
The General Supply Co. of Canada Ltd.
Ottawa Toronto Winnipeg

If what you want is not advertised in this issue consult the Buyers' Directory at the back.

GEARS

HAMILTON
GEAR & MACHINE CO.

Cor. Concord & Van Horne — TORONTO

Cut gears only. The rough, molded kind are obsolete.

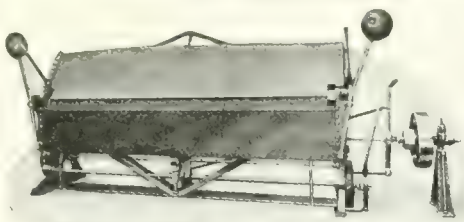
Uncertainty becomes Certainty when you have your material and apparatus tested and inspected by us.

Get the benefit of many years of service.

CANADIAN INSPECTION AND TESTING LABORATORIES, LIMITED
Head Office and Main Laboratories—MONTREAL
Branch Offices and Laboratories:
TORONTO, WINNIPEG, EDMONTON, VANCOUVER, NEW GLASGOW.

Chicago Steel Bending Brakes

We are exclusive Manufacturers of Steel Bending Brakes, and our product shows it.



10 ft. for 10 Ga.

Only about three horsepower is required to operate this brake full capacity.

Catalog giving full description mailed upon request.

The Steel Bending Brake Works, Ltd., Chatham, Ontario

Toronto Testing Laboratory
LIMITED
METALLURGISTS CHEMISTS FUEL ENGINEERS
160 Bay St., Toronto.

Tests of Metals, Fuels, Oils, Water, Etc.
SPECIAL ATTENTION TO ALL SHELL MATERIALS

PRESSES — ALL TYPES

Press Attachments, Automatic.
Metal and Wire Forming Machines.
Tumblers—Large Line.
Burnishing Machines, Grinders.
Special Machines.

Baird Machine Co., Bridgeport, Conn.

The Garvin Machine Co.

Manufacturers of

Milling Machines; Profiling Machines; Cam Cutting Machines; Screw Machines; Monitor Lathes; Die Slotting Machines; Screw Slotters; Tapping Machines; Duplex Horizontal Drills; Gang Drill Presses; Four-Head Right-Angle Drills; Wrenchless Chucks; Spring Coilers; Cutter Grinding Machines; Surface Grinders; Hole Grinders; Hand Lathes and Special Machinery.

We Want All To Have Our Catalog—Send For It To-day.

Spring and Varick Streets NEW YORK CITY

20 TIMES THE SERVICE

That's what this self-hardening, high-speed steel chaser does for the LANDIS DIE. Four long cutters tangentially disposed to the work carried in suitable holders make an ideal cutting condition. This, along with its many other distinctive characteristics, has established for us a world-wide reputation.

WRITE FOR CATALOGUE NO. 21.

Landis Machine Co., Waynesboro, Pa.
Exclusive Canadian Representatives, Wilhams & Wilson, Montreal, Canada.

PULLEYS

ALL WOOD—COMBINATION—IRON—STEEL

Every pulley fully guaranteed
Write for interesting printed matter.

The Positive Clutch & Pulley Works, Ltd.
Montreal Factory: Aurora, Ont. Toronto

J. C. McLAREN BELTING

OAK EXTRA TANNED — J. C. McLAREN BELTING CO. — EST. 1856

Will Save You Money In Every Day of Service

Modern plant and thorough knowledge of requirements of belting guarantees perfect satisfaction to all buyers. Our belts are the result of using best leather and our 57 year's experience.

Ask for Quotations.

J. C. McLAREN BELTING CO.
Limited
Montreal Toronto Winnipeg

Detective and Stop Watch Combined.

"We have a counter on every one of our presses, even the foot presses." This from a satisfied user of our counters. If you use presses our counters would save you money. Ask for catalog 25.

The C. J. ROOT CO., 125 Bridge Street, Bristol, Conn.

For Accuracy and Durability Apply Durant Counters

DURANT MFG. COMPANY
Milwaukee, Wisconsin

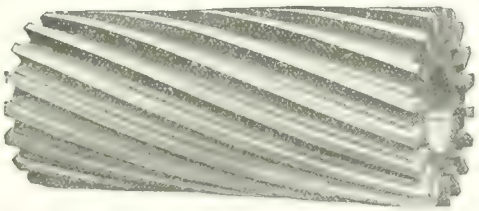
GEARS AND GEAR CUTTING SPROCKETS AND CHAINS

In stock and to order in any size up to and equivalent inch to six feet in diameter, any material. Estimates and gear advice cheerfully furnished.

Grant Gear Works, Inc., 151 Pearl St. Boston, Mass.
C. B. GRANT

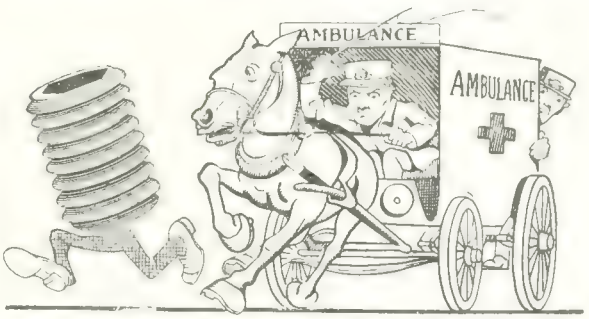
NORTON JACKS
For all kinds of heavy lifting
Send for complete catalogue showing 50 styles 10 to 100 tons capacity.
Made only by
A. O. NORTON, LIMITED
Coaticook, Prov. Quebec Canada

Taylor-Newbold Milling Cutters



Send for Bulletin R. P. and 30-day trial offer.

THE TABOR MANUFACTURING COMPANY
PHILADELPHIA, PA., U.S.A.



Don't wait till you have an accident to get your machinery screwed with Allen Set Screws, and set them with Allen Wrenches.

Also screws, cap and hollow head, in stock or Special Nuts and sample screw.

THE ALLEN MFG. CO., Hartford, Conn., U S.A.
England; 173 Princess Street, Manchester

Made in Canada

The largest manufacturers of Shells in Canada and the United States

are using the

NATIONAL-CHAPMAN ELEVATING TRUCK

Illustrated catalog C E sent, or our Canadian representative will call upon request. Address all inquiries to

J. A. Hunter
Canadian Representative

National Scale Co.
BRANTFORD, ONTARIO

"Made on Honor"

LEVIATHAN AND ANACONDA
ELEVATING
TRANSMITTING
CONVEYING
BELTING

This is our obligation. Hold us to it.

We guarantee at least dollar for dollar service compared with any other belt you have ever used actually.

Leviathan and Anaconda

may be depended upon to give you considerably more than this in Service, with an additional saving in time and attention.

Let us help you solve your belting problems.

Main Belting Co. of Canada

Limited

10½ St. Peter St., - MONTREAL

Two 150-Ton Whiting Electric Traveling Cranes, Cedars Rapids Mfg. & Power Co., Cedars, P.Q.

Power Plant Cranes

We make a specialty of cranes for power house service —electric or hand power. Clearance diagrams and other data gladly furnished to engineers on request.

SEND FOR CATALOG NO. 110.

Complete Foundry Equipments

WHITING FOUNDRY EQUIPMENT CO. HARVEY-ILL. U.S.A. CHICAGO SUBURB.

Cranes of all Kinds

ECONOMIC WATER OIL

SHELL MANUFACTURERS use ECONOMIC WATER OIL for METAL CUTTING of every description; it will not gum nor rust, and it SAVES TIME AND LABOR.

WE CAN SAVE YOU 50% in the **COST** of your **CUTTING MIXTURE** BECAUSE

ONE GALLON of ECONOMIC WATER OIL will mix readily with **30 to 50** gallons of WATER, making a thick, creamy emulsion, and giving you a cutting mixture which will not only be **satisfactory**, but will produce very **ECONOMIC RESULTS.**

One TRIAL ORDER will **prove** our STATEMENT

Made in Canada

Canadian Economic Lubricant Co.

LIMITED

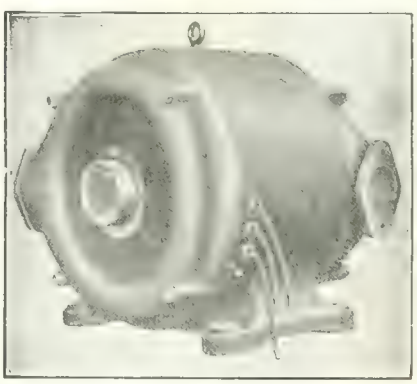
1040-1042 Durocher St. MONTREAL

The Lancashire Dynamo & Motor Company, of Canada, Limited

107-109 Duke Street, TORONTO

ELECTRICAL MACHINERY for all Purposes.

ELLIOTT BROS'. { INSTRUMENTS / RECORDING GAUGES



PIPE VENTILATED A C MOTOR

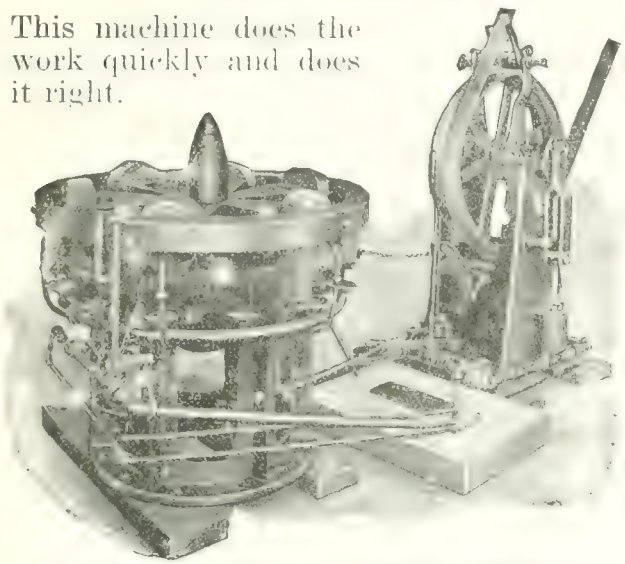
FOR VERY DIRTY PLACES

The advertiser would like to know where you saw his advertisement—tell him.

Hydraulic Banding Machine

For compressing bands on shrapnel shells and other projectiles

This machine does the work quickly and does it right.



In writing us state machine or quotation please advise width and thickness of bands and diameter of shells to be handled.

Machines in use on Canadian Customers are built in Hamilton, Ont.

We also manufacture machines for setting wagon and carriage tires, cold

Please address all communications to our Rochester Office

THE WEST TIRE SETTER COMPANY
ROCHESTER, NEW YORK

PRESSES

Pumps and Accumulators

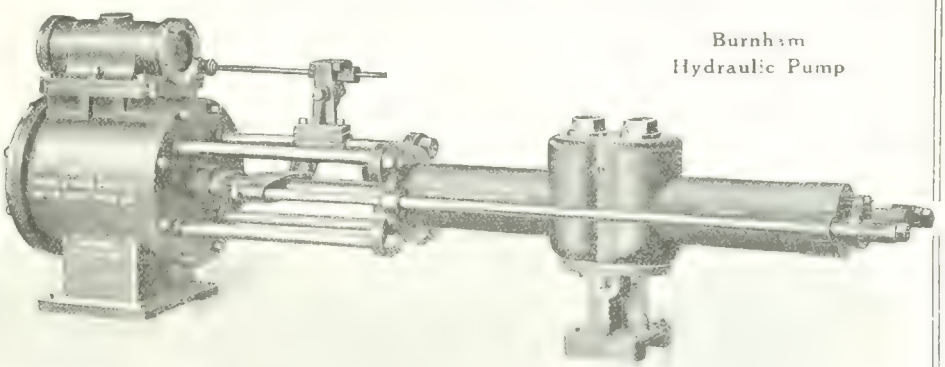
FOR ALL PURPOSES

Made in Canada

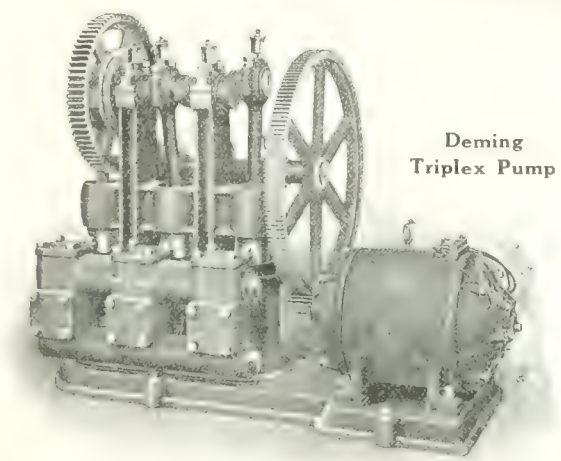
NOSING PRESS

WILLIAM R. PERRIN, Limited
TORONTO

Pumps for SHELL MAKERS



Burnham Hydraulic Pump



Deming Triplex Pump

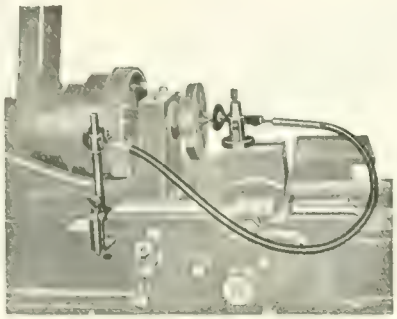
GOOD PUMPING MACHINERY is essential to greatest output on shells or any other work.

We manufacture a special pump for every kind of service.

Tell us what you need and ask for full details.

MADE IN CANADA

Darling Brothers Limited
Toronto MONTREAL Winnipeg



CENTER GRINDER

(Improved)

CHEAP! PRACTICAL! DURABLE!

The most popular tool of its kind on the market. Adjusted in a moment.

An occasional use will keep your Lathe centers in perfect order.

Stow Mfg. Co.

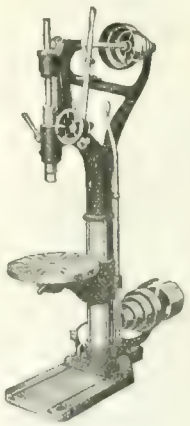
Binghamton, N.Y., U.S.A.

London, Eng., Stock, 85 Queen Victoria Street.
Oldest Portable Tool Manufacturers in America.

The

TRADE B MARK W.F. & J.B.

BARNES DRILLS



Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

SEND FOR CATALOG.

W. F. & JOHN BARNES CO.

104 Ruby Street - ROCKFORD, ILL.
Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.
WILLIAMS & WILSON, Montreal

PARTRIDGE

Emery Grinders

Are Good Grinders

WITH THE PRICE GROUND DOWN

Popular for garage, shop or factory. Thousands of Canadian shops engaged in the manufacture of shrapnel shells will find splendid use for this tool for grinding their tool bits, drills, hand tools, lathe tools, etc.

We want to place at least one of these grinders in every shop in Canada where good work at a low cost is wanted.

ARE YOU ONE OF THESE SHOPS?

Manufactured by

E.O.PARTRIDGE

2039-49 West Lake St.
CHICAGO

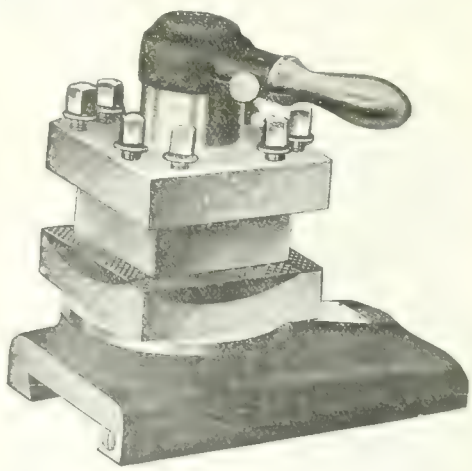
Good Canadian Agents Wanted
WRITE.

Making SHRAPNEL ?

Here is Standard Equipment

The Fay & Scott turret tool post shown here is being universally adopted as standard equipment for the manufacture of shrapnel.

The square head turret, style G, is used for turning the outside of the shell. We have made these turrets for years, and can fit them to any make or size of lathe, old or new.



Style G

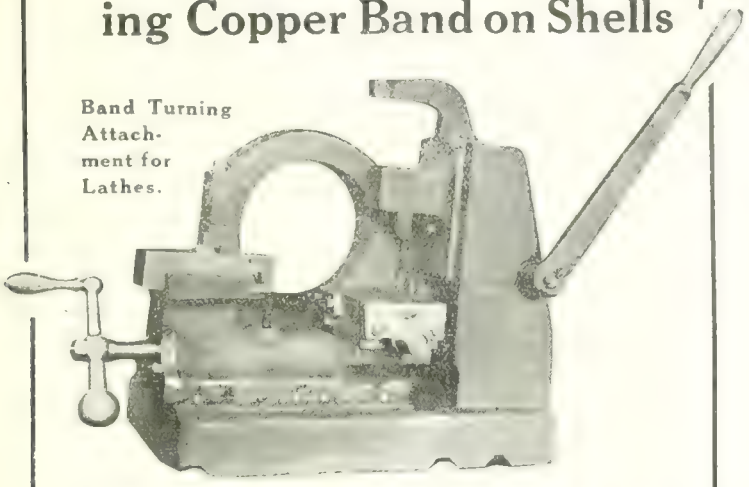
Catalog and full details on request

Fay & Scott, Dexter, Me.

The advertiser would like to knowis issue consult the Buyers' Directory at the back.

A Time-Saver for Turning Copper Band on Shells

Band Turning Attachment for Lathes.



This attachment will fit any engine lathe, and with its use you can turn the copper band on Shrapnel Shells down to size required and burnish them *all in one operation.*

With this device we will guarantee an output of

50 Turned Copper Bands per Hour

Used with a specially constructed steel chuck, casting of which can be finished on the lathe on which the attachment will be used.

Castings are supplied by us

WRITE FOR PARTICULARS.

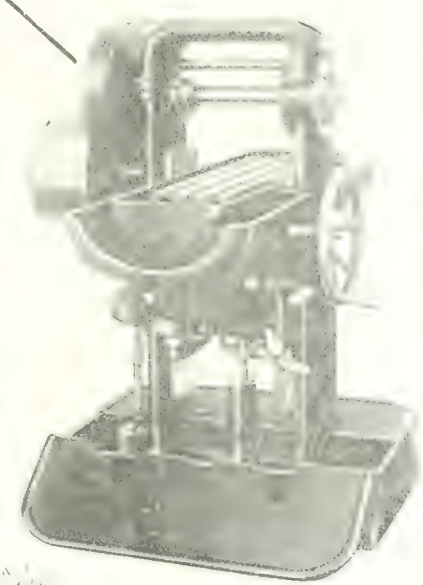
LYMBURNER LIMITED

5-15 Commissioners St. Montreal, P. Que.

The "BRIGGS" Miller

Just in its element in heavy, fast and accurate production

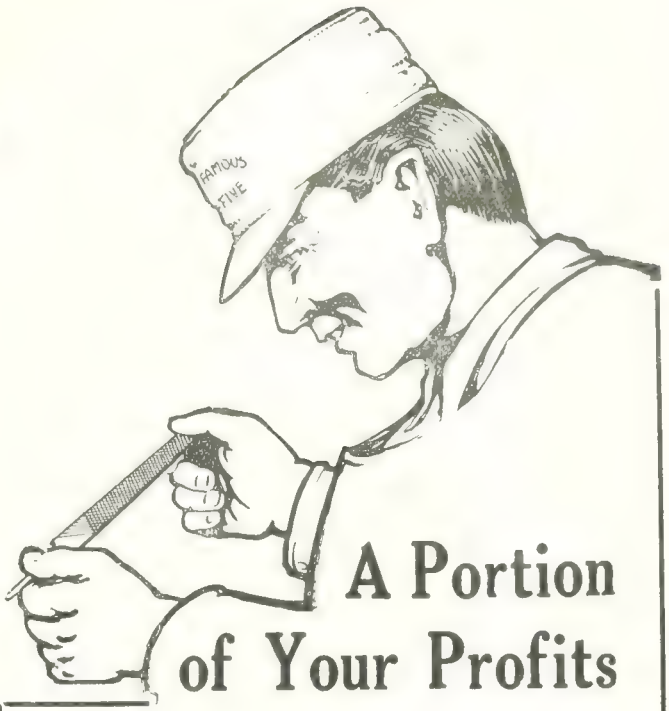
Increased the production for the Reo Motor Car Co. from 8 to 20 per hour, as compared with methods previously used.



GOOLEY & EDLUND

Inc.

Cortland, U.S.A.



A Portion of Your Profits

is being thrown away by allowing your men to use their files too long.

When a file becomes half worn it naturally takes longer to do its work.

Who and what suffers?

You lose money by paying your men for lost time.

Time is lost on completion of the job.

The work suffers through being done with inefficient tools.

And the workmen get slack.

The obvious remedy is to educate your workmen to throw away their files when they become half-worn. The money saved in time and labor offsets many, many times the small cost of a new file.

And the files to buy are those used by 90% of Canada's file users.

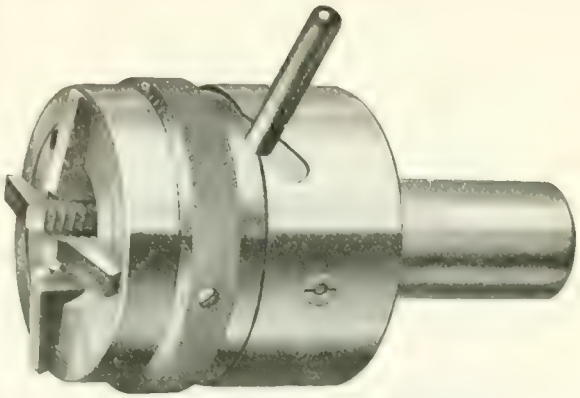
KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE
(Made in Canada

With our 50 years' experience in file-making [illegible] we are in a position to give you efficient files.

Drop us a card for your FREE copy of "[illegible]."

Nicholson File Company

Port Hope Ontario



Wells Self-Opening Die—Model B.

The simplest and most efficient of all automatic opening die heads.

The principle of construction safeguards and insures perfect work. This die is now giving satisfaction in hundreds of shops.

Good Threads Cost Less Than Poor Ones

The advent of the W.S.O.D. in his shop, has opened the eyes of many a manufacturer producing screw threads to the fact that he can

Increase Production, Decrease Costs and Cut Perfect Threads

all at one and the same time.

Do you want us to prove it? We are ready.

We want to send you the booklet describing the different models. Are you willing to try the W.S.O.D. in your shop under your own conditions?

WELLS BROTHERS COMPANY OF CANADA, Limited

GALT - ONTARIO

Sales Agents:

The Canadian Fairbanks-Morse Company, Limited, Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary.

A Disc Grinder Equipped with Carborundum or Aloxite Discs will Reduce Production Costs

Surfacing Brass Clock Frames—Carborundum Discs.

FOR removing limited amounts of stock and producing true, clean flat surfaces, the Disc Grinder is wonderfully fast, truly economical—but for more work, faster production and better results see that your disc machines are equipped with Carborundum Disc for brass, bronze, aluminum, cast iron, etc., and with Aloxite Discs for all steel and malleable iron work.

Every disc uniformly coated with clean, sharp, fast-cutting, long-lived grains, and the grains stay on.

Cut to any size
Made in any grit

The Carborundum Company

Niagara Falls, N. Y.

New York Chicago Boston Philadelphia Cleveland Cincinnati Pittsburgh Milwaukee Grand Rapids Manchester, Eng.

The advertiser would like to know where you saw his advertisement—tell him.

CANADIAN MACHINERY BUYERS' DIRECTORY

TO OUR READERS—Use this directory when seeking to buy any machinery or power equipment. You will often get information that will save you money.

TO OUR ADVERTISERS—Send in your name for insertion under the headings of the lines you make or sell

TO NON-ADVERTISERS—A rate of $5 per line a year is charged non-advertisers.

Abrasive Materials.
Can. Fairbanks-Morse Co., Montreal.
Carborundum Co., Niagara Falls, N.Y.
Ford-Smith Machine Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.
Norton Co., Worcester, Mass.
Stevens, F. B., Detroit, Mich.

Acetylene.
L'Air Liquide Society, Montreal, Toronto.
Lever Bros., Toronto.

Acetylene Generators.
L'Air Liquide Society, Montreal, Toronto.
Lever Bros., Toronto.

Accumulators, Hydraulic.
Can. Boomer & Boschert Press Co., Montreal.
Charles F. Elmes Eng. Wks., Chicago.
Mesta Machine Co., Pittsburg, Pa.
William R. Perrin, Ltd., Toronto
Southwark Foundry & Machine Co., Philadelphia.
Wm. Tod Company, Youngstown, O.
Watson-Stillman Co., Aldene, N.J.

Air Compressors.
Canadian Ingersoll-Rand Co., Ltd., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Smart-Turner Machine Co., Hamilton, Ont.

Air Hoists.
Whiting Foundry Equipment Co., Harvey, Ill.

Air Hose.
Can. H. W. Johns-Manville Co., Limited, Toronto.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Can. Ingersoll Rand Co., Montreal.

Air Receivers.
Can. Ingersoll-Rand Co., Montreal.

Air Washers.
Buffalo Forge Co., Buffalo, N.Y.
Can. Sirocco Co., Ltd., Windsor, Ont.

Ammeters.
Can. H. W. Johns-Manville Co., Limited, Toronto.

Aluminum.
Tallman Brass & Metal Co., Hamilton.

Alloys, Steel.
H. A. Drury Co., Ltd., Montreal.
Hawkridge Bros. Co., Boston, Mass.
Vanadium Alloys Steel Co., Pittsburg, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa

Annunciator Systems.
Lintz-Porter Co., Toronto.

Arbors.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill and Machine Co., New Bedford.
Plessisville Foundry, Plessisville, Que.
Pratt & Whitney Co., Dundas, Ont.

Assembling Stands.
Skinner Chuck Co., New Britain, Conn.

Automatic Chucks.
Garvin Machine Co., New York.

Asbestos Packing.
Can. H. W. Johns-Manville Co., Limited, Toronto.

Autogenous Welding and Cutting Plants.
L'Air Liquide Society, Montreal, Toronto.
Lever Bros., Toronto.

Automatic Index Milling Machines.
Garvin Machine Co., New York.
National Machinery and Supply Co., Hamilton.

Automatic Machinery.
Baird Machine Co., Bridgeport, Conn.
A. R. Williams Machy. Co., Toronto.
Gardner, Robt. & Son, Montreal.
Girard Machine & Tool Co., Philadelphia, Pa.
Motch & Merryweather Machy. Co., Cleveland, O.
National Machinery & Supply Co., Hamilton.
Pratt & Whitney Co., Dundas, Ont.
Owen Sound Iron Works Co., Owen Sound.
Windsor Machine Co., Windsor, Vt.

Automatic Multiple Spindle.
Windsor Machine Co., Windsor, Vt.

Automatic Wood Screw Machines.
Asa F. Cook Co.

Axle Cutters.
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Hespeler, Ont.

Babbitt Metal.
Can. Fairbanks-Morse Co., Montreal.
Hoyt Metal Co., Toronto.
Magnolia Metal Co., Montreal.
Tallman Brass & Metal Co., Hamilton.

Baking Ovens.
Oven Equipment & Mfg. Co., New Haven, Conn.
Owen Sound Iron Works Co., Owen Sound.

Ball Bearings.
Can. Fairbanks-Morse Co., Montreal.
Chapman Double Ball Bearing Company, Toronto.

Ball Burnishing Machines.
Baird Machine Co., Bridgeport, Conn.

Banding Machines, Hydraulic.
West Tire Setter Co., Rochester, N.Y.

Barrels, Steel Shop.
Baird Machine Co., Bridgeport, Conn.
Cleveland Wire Spring Co., Cleveland.

Bars, Boring.
Charles F. Elmes Eng. Works, Chicago
Niles-Bement Pond Co., New York.
Owen Sound Iron Works Co., Owen Sound.

Bar Benders and Straight Edges.
Steel Bending Brake Works, Ltd., Chatham, Ont.

Bar Benders, Hydraulic.
Charles F. Elmes Eng. Works, Chicago
Watson-Stillman Co., Aldene, N.J.

Bar Twisting Machines.
Mesta Machine Co., Pittsburg, Pa.

Batteries and Accessories.
Lintz-Porter Co., Toronto.

Bell Systems.
Lintz-Porter Co., Toronto.

Belt Benches.
Tabor Mfg. Co., Philadelphia, Pa.

Belt Dressing and Cement.
Graton & Knight Mfg. Co., Montreal.

Belt Lacing, Leather.
Graton & Knight Mfg. Co., Montreal.

Belting, Chain.
Can. Fairbanks-Morse Co., Montreal.
Graton & Knight Mfg. Co., Montreal.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.

Belting, Cotton.
General Supply Co. of Canada, Ltd., Ottawa.
Dominion Belting Co., Hamilton.

Belting, Leather.
Can. Fairbanks-Morse Co., Montreal.
General Supply Co. of Canada, Ltd., Ottawa.
Girard Machine & Tool Co., Philadelphia, Pa.
Graton & Knight Mfg. Co., Montreal.
Main Belting Co., Montreal
Morse Chain Co., Ithaca, N.Y.

Belting, Stitched Cotton Duck.
General Supply Co. of Canada, Ltd., Ottawa.
Dominion Belting Co., Hamilton, Ont.
Main Belting Co., Montreal.

Belting, Rubber.
Can. H. W. Johns-Manville Co., Limited, Toronto.

Benders, Angle and Tee Iron.
Can. Buffalo Forge Co., Montreal.
Watson-Stillman Co., Aldene, N.J.

Bending Machinery.
John Bertram & Sons Co., Dundas.
Bertrams, Limited, Edinburgh, Scotland.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Buffalo Forge Co., Montreal.
Can. Machinery Corporation, Galt, Ont.
Charles F. Elmes Eng. Works, Chicago
Jardine, A. B., & Co., Hespeler, Ont.
National Machinery Co., Tiffin, Ohio.
National Machinery & Supply Co., Hamilton.
Niles-Bement-Pond Co., New York.
Owen Sound Iron Works Co., Owen Sound.
Toledo Machine & Tool Co., Toledo, O.
Steel Bending Brake Works, Chatham, Ont.
Watson-Stillman Co., Aldene, N.J.

Bins, Steel.
Dennis Wire & Iron Works Co., Ltd., London, Canada.
Toronto Iron Works, Ltd., Toronto.

Bit Brace Tools.
Wells Bros. Co., Greenfield, Mass.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Blast Gauges, Cupola.
Can. Buffalo Forge Co., Montreal.
Sheldons, Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

Blocks, Lifting.
Northern Crane Works, Walkerville.

Blowers.
Can. Buffalo Forge Co., Montreal.
Can. Sirocco Co., Ltd., Windsor, Ont.
Chicago Flexible Shaft Co., Chicago, Ill.
Girard Machine & Tool Co., Philadelphia, Pa.
Sheldons, Ltd., Galt, Ont.
Southwark Foundry & Machine Co., Philadelphia.

Blow Pipes and Regulators.
L'Air Liquide Society, Montreal, Toronto.
Lever Bros., Toronto.

Bluing Ovens.
Oven Equipment & Mfg. Co., New Haven, Conn.

Boilers.
Can. Locomotive Co., Kingston, Ont.
General Supply Co. of Canada, Ltd., Ottawa.
National Machinery & Supply Co., Hamilton.
Owen Sound Iron Works Co., Owen Sound.
Plessisville Foundry, Plessisville, Que.

Boiler Compounds.
Can. H. W. Johns-Manville Co., Limited, Toronto.

Boiler Graphite.
Dixon Crucible Co., Jersey City, N.J.

Boiler Makers' Supplies.
Jno. F. Allen Co., New York.

Bolt Cutters and Nut Tapers.
Wells Brothers Co., Greenfield, Mass.

Bolts.
Galt Machine Screw Co., Galt, Ont.
London Bolt & Hinge Works, London, Ont.

Bolt and Nut Machinery.
A. R. Williams Machy. Co., Toronto.
John Bertram & Sons Co., Dundas, Ont.
Owen Sound Iron Works Co., Owen Sound.
Gardner, Robt., & Son, Montreal.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, O.
National Machinery & Supply Co., Hamilton.
Wiley & Russell Co., Greenfield, Mass.

Books.
MacLean Publishing Co., Toronto.

Boring Machines, Upright and Horizontal.
John Bertram & Sons Co., Dundas.
Colburn Machine Tool Co., Franklin Pa.
Garlock-Machinery, Toronto.
Girard Machine & Tool Co., Philadelphia, Pa
Hill Clarke & Co., of Chicago, Chicago, Ill
Motch & Merryweather Machy. Co., Cleveland, O.
National Machinery & Supply Co., Hamilton.
Niles-Bement-Pond Co., New York.
Stow Mfg. Co., Binghamton, N.Y.

Boring Machines, Pneumatic, Cylinder.
Baker Brothers, Toledo, O.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll Rand Co., Montreal.
Independent Pneumatic Tool Co., Chicago, Ill.
Stow Mfg. Co., Binghamton, N.Y.

Boring and Turning Mills.
John Bertram & Sons Co., Dundas.
Girard Machine & Tool Co., Philadelphia, Pa.
National Machinery & Supply Co., Hamilton.
Niles-Bement-Pond Co., New York.

Boxes, Annealing, Charging.
Mesta Machine Co., Pittsburg, Pa.

Box Puller.
Jardine, A. B., & Co., Hespeler, Ont.

Boxes, Steel Shop.
Cleveland Wire Spring Co., Cleveland.

Boxes, Tote.
Cleveland Wire Spring Co., Cleveland.

Brakes.
Brown, Boggs & Co., Hamilton, Can.
Whiting Foundry Equipment Co., Harvey, Ill.

Brakes, Heavy Plate Bending and Cornice.
Steel Bending Brake Works, Ltd., Chatham, Ont.

Brass Working Machinery.
A. R. Williams Machy. Co., Toronto.
Gardner, Robt., & Son, Montreal.
Girard Machine & Tool Co., Philadelphia, Pa.
National Machinery & Supply Co., Hamilton.
Warner & Swasey Co., Cleveland.
Niles-Bement-Pond Co., New York.

Brick Cars.
Can. Buffalo Forge Co., Montreal.
Sheldons, Ltd., Galt, Ont.

Brick Dryers.
Can. Buffalo Forge Co., Montreal.
Can. Sirocco Co., Ltd., Windsor, Ont.
Sheldons, Ltd., Galt, Ont.

Brick Machinery.
Eastern Machinery Co., New Haven.
Sheldons, Ltd., Galt, Ont.

Bridges, Railway and Highway.
Can. Bridge Co., Walkerville, Ont.

Buckets, Clam Shell, Crab and Dump.
Whiting Foundry Equipment Co., Harvey, Ill.

Buffing and Polishing Machinery.
Canadian Hart Wheels, Ltd., Hamilton, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Girard Machine & Tool Co., Philadelphia, Pa.
Gray Mfg & Machine Co., Toronto.
New Britain Machine Co. New Britain, Conn.

Bulldozers.
John Bertram & Sons Co., Dundas.
E. W. Bliss Co., Brooklyn, N.Y.
Canada Mach. Corporation, Galt, Ont.
National Machinery & Supply Co., Hamilton, Ont.
Watson-Stillman Co., Aldene, N.J.

Burners, Enclosed Flame Gas.
Oven Equipment & Mfg. Co., New Haven, Conn.

Burners, Fuel, Oil and Natural Gas.
Whiting Foundry Equipment Co. Harvey, Ill.

Burring Reamers.
Wells Brothers Company, Greenfield Mass.
Wilt Twist Drill Co. of Canada, Ltd. Walkerv Ont.

Butterise.
Wells Brothers Company, Greenfield Mass.

Burrs, Iron and Copper.
Parmenter & Bulloch Co., Gananoque

Canners' Machinery.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
National Machinery & Supply Co., Hamilton, Ont.

Caissons.
Toronto Iron Works Ltd., Toronto.

Cars, Charging Box Ingot.
Mesta Machine Co., Pittsburg, Pa.

Cars, Industrial.
Can. Buffalo Forge Co., Montreal.
Can. Fairbanks-Morse Co., Montreal
Sheldons, Limited, Galt, Ont.
Whiting Foundry Equipment Co. Harvey, Ill.

Castings, Aluminum.
Cunningham & Son, St. Catharines, Ont.
Owen Sound Iron Works Co., Ltd., Owen Sound, Ont.
St. Lawrence Foundry, Galt, Ont.
Tallman Brass & Metal Co., Hamilton

Castings, Air Furnaces.
Wm. Tod Company, Youngstown, O.

Castings, Brass.
Cunningham & Son, St. Catharines, Ont.
Alexander Fleck, Ltd., Ottawa.
T. C. Lawrence Foundry, Galt, Ont.
Mesta Machine Co., Pittsburg, Pa.
Owen Sound Iron Works Co., Owen Sound.
Plessisville Foundry, Plessisville, Que.
Tallman Brass & Metal Co., Hamilton
Wm. Tod Company, Youngstown, O

Castings, Bronze.
Cunningham & Son, St. Catharines, Ont.
Mesta Machine Co., Pittsburg, Pa.
Tallman Brass & Metal Co., Hamilton
Wm. Tod Company, Youngstown, O

Castings, Copper.
Cunningham & Son, St. Catharines, Ont.
Tallman Brass & Metal Co., Hamilton, Ont.

Castings, Gray Iron.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Erie Foundry Co., Erie, Pa.
Alexander Fleck, Ltd., Ottawa.
Gardner, Robt., & Son, Montreal.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
Mesta Machine Co., Pittsburg, Pa.
Owen Sound Iron Works Co., Owen Sound.
Plessisville Foundry, Plessisville, Que.
Wm. Tod Company, Youngstown, O.

Castings, Steel Chrome and Manganese Steel.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
Mesta Machine Co., Pittsburg, Pa.
Wm. Tod Company, Youngstown, O.

Castings, Malleable.
Galt Malleable Iron Co., Galt.

Castings, Nickel Steel.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
Mesta Machine Co., Pittsburg, Pa.

Cement, Disc Wheel.
Gardner Machine Co., Beloit, Wis.

Cement, Iron.
Can. H. W. Johns-Manville Co., Limited, Toronto.
Shelton Metallic Filler Co., Derby, O.

Cement Machinery.
Can. Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
National Machinery & Supply Co., Hamilton, Ont.
Owen Sound Iron Works Co., Owen Sound.

Centre Reamers.
Wells Brothers Co., Greenfield, Mass.

Centering Machines.
John Bertram & Sons Co., Dundas.
Gardner, Robt., & Son, Montreal.
Girard Machine & Tool Co., Philadelphia, Pa.
Hurlbut, Rogers Machinery Co., South Sudbury, Mass.
National Machinery & Supply Co., Hamilton.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.

Centrifugal Pumps.
Can. Buffalo Forge Co., Montreal.
Pratt & Whitney Co., Dundas, Ont.
Southwark Foundry & Machine Co., Philadelphia, Pa.
Smart-Turner Machine Co., Hamilton, Ont.

Chain Blocks.
Can. Fairbanks-Morse Co., Montreal.
National Machinery & Supply Co., Hamilton.

Chains, Silent and Transmission.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.
Plessisville Foundry, Plessisville, Que.

Chemists.
Can Inspection & Testing Laboratories, Ltd., Montreal.
Toronto Testing Laboratory, Ltd., Toronto.

Chucks, Aero, Automatic.
Garvin Machine Co., New York.

Chucks, Drill, Lathe and Universal.
John Bertram & Sons Co., Dundas, Ont.
Buffalo Forge Co., Buffalo, N.Y.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Cushman Chuck Co., Hartford, Conn.
Gardner, Robt., & Son, Montreal.
Girard Machine & Tool Co., Philadelphia, Pa.
Wells Brothers Co., Greenfield, Mass.
Jacobs Mfg. Co., Hartford, Conn.
Ker & Goodwin, Brantford.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
National Machinery & Supply Co., Hamilton.
Skinner Chuck Co., New Britain, Conn.
D. E. Whiton Machine Co., New London, Conn.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Chucks, Drill, Automatic and Keyless.
Buffalo Forge Co., Buffalo, N.Y.

Chucks, Ring Wheel.
Gardner Machine Co., Beloit, Wis.

Chucking Machines.
Garvin Machine Co., New York.
Girard Machine & Tool Co., Philadelphia, Pa.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Turner Machine Co., Danbury, Conn.
Warner & Swasey Co., Cleveland, O.

Clocks, Time and Watchman's.
Lintz-Porter Co., Toronto.

Cloth and Wool Dryers.
Canada Wire & Iron Goods Co., Hamilton, Ont.
Sheldons, Limited, Galt.

Clutches.
Eastern Machinery Co., New Haven, Conn.
Jones & Glassco, Montreal.
Owen Sound Iron Works Co., Owen Sound.
Positive Clutch & Pulley Works, Ltd., Toronto.

Coal Handling Machinery.
Whiting Foundry Equipment Co., Harvey, Ill.

Coke and Coal.
Hanna & Co., M. A., Cleveland, O.

Collectors, Pneumatic.
Can. Buffalo Forge Co., Montreal.
Sheldons, Limited, Galt.

Compressors, Air.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago.
Mesta Machine Co., Pittsburg, Pa.
National Machinery & Supply Co., Hamilton.
Southwark Foundry & Machine Co., Philadelphia, Pa.
The Smart-Turner Machine Co., Hamilton.

Concentrating Plant.
Gardner, Robt., & Son, Montreal.

Concrete Mixers.
A. R. Williams Machy. Co., Toronto.
Can. Fairbanks-Morse Co., Montreal.
National Machinery & Supply Co., Hamilton.

Concrete Reinforcement.
Canada Wire Goods Mfg. Co., Hamilton.

Condensers.
Can. Buffalo Forge Co., Montreal.
Mesta Machine Co., Pittsburg, Pa.
The Smart-Turner Machine Co., Hamilton.
Southwark Foundry & Machine Co., Philadelphia.
Wm. Tod Company, Youngstown, O.

Contracting Engineers, Electrical
Lintz-Porter Co., Toronto.

Controllers and Starters, Electric Motor.
A. R. Williams Machy. Co., Toronto.
Toronto & Hamilton Electric Co., Hamilton, Ont.

Conveyor Machinery.
Can. Fairbanks-Morse Co., Montreal.
National Machinery & Supply Co., Hamilton, Ont.
Plessisville Foundry Plessisville Que.
The Smart-Turner Machine Co., Hamilton.

Coping Machines.
Can. Buffalo Forge Co., Montreal.
John Bertram & Sons Co., Dundas.
National Machinery & Supply Co., Hamilton, Ont.
Niles-Bement-Pond Co., New York.

Cornice Brakes.
Brown Boggs Co., Ltd., Hamilton Canada.
Steel Bending Brake Wks., Chatham.

Counting Machines.
W. N. Durant Co., Milwaukee, Wis.
National Scale Co., Chicopee Falls, Mass.
C. J. Root Co., Bristol, Conn.

Counterbores and Countersinks.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co., Greenfield, Mass.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Countershafts.
Baird Machine Co., Bridgeport, Conn.
Wells Bros. Co., Greenfield, Mass.

Country House Lighting and Cooking.
Can. Blaugas Co., Montreal.

Couplings.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Eastern Machinery Co., New Haven, Conn.
Gardner, Robt., & Son, Montreal.
Owen Sound Iron Works Co., Owen Sound, Ont.

Couplings, Air Hose.
Cleveland Pneumatic Tool Co, of Canada, Toronto.

Crabs, Travelling.
Owen Sound Iron Works Co., Owen Sound.

Cranes, Locomotive.
Northern Crane Works, Walkerville.

Cranes, Gantry.
Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes, Goliath.
Herbert Morris Crane & Hoist Co., Ltd., Toronto.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes, Hydraulic.
Southwark Foundry & Machine Co., Philadelphia.
Watson-Stillman Co., Aldene, N.J.

Cranes, Pneumatic.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes, Post Jib.
Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes, Portable.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes, Swing Jib.
Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes, Transfer.
Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co. Harvey, Ill.

Cranes, Wall.
Northern Crane Works, Walkerville.
Smart Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes, Travelling Electric and Hand Power.
Dominion Bridge Co., Montreal.
Niles Bement-Pond Co., New York.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

Crane, Chain.
Northern Crane Works, Walkerville.

Cranes, All Kinds.
Northern Crane Works, Walkerville.
Owen Sound Iron Works Co., Owen Sound, Ont.
Southwork Foundry & Machine Co., Philadelphia.
Harvey Ill.
Whiting Foundry Equipment Co.,

Crank Pin Turning Machine.
Niles-Bement-Pond Co., New York.

Crimps, Leather.
Graton & Knight Mfg. Co., Montreal.

Cupolas.
Can. Buffalo Forge Co., Montreal.
Northern Crane Works, Walkerville.
Sheldons, Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

Cupola and Blast Gate Blowers.
Can. Sirocco Co., Ltd., Windsor, Ont.

Cupola Blast Gauges & Blowers.
Sheldons, Ltd., Galt, Ont.

Cutters, Angle, Tee Iron and Bar.
Can. Buffalo Forge Co., Montreal.

Cutters, Flue.
Independent Pneumatic Tool Co., Chicago.
Cleveland Pneumatic Tool Co, of Canada, Toronto.

Cutters, Pipe.
Can. Fairbanks-Morse Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Trimont Mfg. Co., Roxbury, Mass.

Cutting Compound & Cutting Oil.
Can. Economic Lubricant Co., Montreal.
Can. Oil Companies, Toronto.
Cataract Refining Co., Buffalo, N.Y.
Crescent Oil Co., New York.
Racine Tool & Machine Co., Racine, Wis.

Cutter Grinders and Attachments
Cincinnati Milling Machine Co., Cincinnati.
Garvin Machine Co., New York.
Girard Machine & Tool Co., Philadelphia, Pa.

Cutters, Milling.
A. R. Williams Machy. Co., Toronto
Can. Fairbanks-Morse Co., Montreal
Cleveland Twist Drill Co., Cleveland.
Garvin Machine Co., New York.
Morse Twist Drill and Machine Co., New Bedford.
Tabor Mfg. Co., Philadelphia, Pa.
Pratt & Whitney Co., Dundas, Ont.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville Ont.

Cutting-off Machines.
Armstrong Bros. Tool Co., Chicago.
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Espen-Lucas Machine Wks., Philadelphia, Pa.
Foss & Hill Machy. Co., Montreal.
Garlock Machinery, Toronto.
Garvin Machine Co., New York.
Girard Machine & Tool Co., Philadelphia, Pa.
Geo. Gorton Machine Co., Racine, Wis.
Hurlbut, Rogers Machinery Co., South Sudbury, Mass.
John H. Hall & Sons, Brantford, Ont
Nutter & Barnes Co., Hinsdale, N.H.
Pratt & Whitney Co., Dundas, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
L. S. Starrett Co., Athol, Mass.

Damper Regulators.
Can. Fairbanks-Morse Co., Montreal.

Derricks.
Dominion Bridge Co., Montreal.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Designers, Special Machinery.
Baird Machine Co., Bridgeport, Conn.

Dies and Die Stocks.
Armstrong Mfg. Co., Bridgeport, Conn.
Banfield, W. H. & Son, Toronto.
Butterfield & Co., Rock Island, Que.
Brown, Boggs & Co., Hamilton, Ont.
Can. Fairbanks-Morse Co., Montreal.
Duncan Electrical Co., Montreal.
Gardner, Robt., & Son, Montreal.
Greenfield Tap & Die Corporation, Greenfield, Mass.
A. B. Jardine & Co., Hespeler, Ont.
Modern Tool Co., Erie, Pa.
Morse Twist Drill and Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Wiley & Russell, Greenfield, Mass.

Dies for Bit Brace Use.
Wells Brothers Co., Greenfield, Mass.

Die Sinkers.
Garvin Machine Co., New York.

Dies for Machines.
Wells Brothers Co., Greenfield, Mass.

Die Sinking Presses, Hydraulic
Charles F. Elmes Eng Works Chicago
Watson-Stillman Co., Aldene, N.J.

Dies, Self-opening.
Duncan Electrical Co., Montreal.
Geometric Tool Co., New Haven.
Greenfield Tap & Die Corporation, Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit

ACCURACY

Because a small diameter screw enters the tapped hole is no guarantee that it fits properly.

The pitch may be long or short, and therefore cause resistance, but be a poor fit.

Cap and Set Screws should fit all the way like a shaft in its bearing.

"GALT" Screws do. Try them.

Specialists in Cap and Set Screws.

THE
GALT MACHINE SCREW CO., LIMITED
GALT, ONTARIO

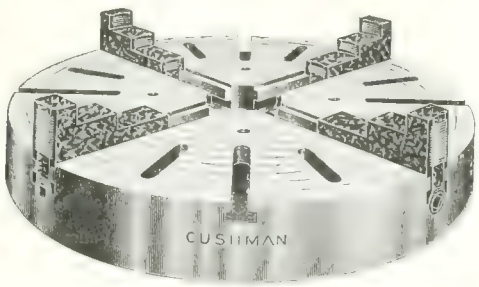
Cleveland Twist Drills Are Hole Producers

Tests in some of the largest shops in this country prove conclusively that Cleveland Twist Drills produce the greatest number of holes per money invested in drills.

Read up on Hole Production. Ask for "Drill Chips" to come monthly.

The Cleveland Twist Drill Co.
New York CLEVELAND, U. S. A. Chicago

Cushman Chucks



When you buy a "Cushman" Chuck you are absolutely sure of getting one having strength, accuracy and durability. Being specialists in these goods we are able to furnish Chucks of quality at a very moderate price.

Our line of styles and sizes is very complete—

Lathe Chucks, Drill Chucks, Centering Chucks, Portable Face Plate Jaws

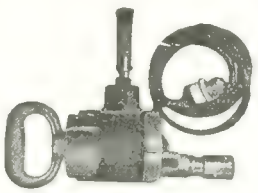
Our regular chucks are known as the heavy pattern, but we now have a new line called "Blue Line" Chucks, made entirely of steel.

Let us send you our catalog.

The Cushman Chuck Co.
Hartford, Conn., U.S.A.

U. S. Electric Drills and Grinders

Save Time, Labor and Money



They can be attached to any lamp socket.

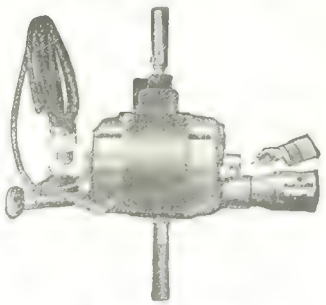
For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

4 SIZES.

3-16	inch,	W.G.T.	6 lbs.
¼	inch,	W.G.T.	9 lbs.
⅜	inch,	W.G.T.	12 lbs.

All motors wound for 110 or 220 volts. Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



½ inch—2 SPEED.
Speed, 400-750 R.P.M

For Sale By
The Canadian Fairbanks-Morse Co., Limited
Montreal, St. John, N.B., Toronto, Winnipeg, Calgary, Vancouver.

THE UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO

If what you want is not advertised in th where you saw his advertisement— tell him.

Dies, Opening.
W. H. Banfield & Sons, Toronto.
Can. Fairbanks-Morse Co., Montreal.
Duncan Electrical Co., Montreal.
Greenfield Tap & Die Corporation, Greenfield, Mass.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Pratt & Whitney Co., Dundas, Ont.

Dies for Screw Plates.
Wells Brothers Co., Greenfield, Mass.

Dies, Sheet Metal Working.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.

Dies, Screws and Thread.
Armstrong Mfg. Co., Bridgeport, Conn.
Greenfield Tap & Die Corporation, Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.

Discs, Leather.
Graton & Knight Mfg. Co., Montreal.

Draughtsman's Tools.
Emmert Mfg. Co., Waynesboro, Pa.

Draft, Mechanical.
W. H. Banfield & Sons, Toronto.
Butterfield & Co. Rock Island, Que.
Can. Buffalo Forge Co., Montreal.
Can. Sirocco Co., Windsor, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Limited, Galt, Ont.

Drill Bolt Cutters.
Cleveland Pneumatic Tool Co. of Canada, Toronto.

Drill Presses.
Baker Bros., Toledo, O.
W. F. & John Barnes Co., Rockford.
Can. Buffalo Forge Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Hill, Clarke & Co. of Chicago, Chicago, Ill.
Garvin Machine Co., New York.
Girard Machine & Tool Co., Philadelphia, Pa.
Niles-Bement-Pond Co., New York.
A. R. Williams Machinery Co., Toronto.

Drilling Machines, Locomotive and Multiple Spindle.
Amalgamated Machy. Corporation, Chicago, Ill.
Baker Bros., Toledo, O.
Barnes Drill Co., Rockford, Ill.
John Bertram & Sons Co., Dundas.
Can. Buffalo Forge Co., Montreal.
Can. Fairbanks-Morse Co., Montreal.
Garlock Machinery, Toronto.
Garvin Machine Co., New York.
Girard Machine & Tool Co., Philadelphia, Pa.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York.

Drilling Machines, Radial and Turret.
Baker Bros., Toledo, O.
Barnes Drill Co., Rockford, Ill.
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Motch & Merryweather Machy. Co., Cleveland, O.
Niles-Bement-Pond Co., New York.
Turner Machine Co., Danbury, Conn.

Drilling Machines, Sensitive.
Baker Bros., Toledo, O.
W. F. & John Barnes Co., Rockford.
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.
Rockford Machine Tool Co., Rockford.

Drilling Machines, Upright and Horizontal.
Amalgamated Machy. Corporation, Chicago, Ill.
Baker Bros., Toledo, O.
Barnes Drill Co., Rockford, Ill.
Colburn Mach. Tool Co., Franklin, Pa.
A. R. Williams Machy. Co., Toronto
W. F. & John Barnes Co., Rockford.
John Bertram & Sons Co., Dundas.
Garlock Machinery, Toronto.
Girard Machine & Tool Co., Philadelphia, Pa.
A. B. Jardine & Co., Hespeler, Ont.
Rockford Machine Tool Co., Rockford.
R. McDougall Co., Galt.
Motch & Merryweather Machy. Co., Cleveland, O.
Niles Bement Pond Co., New York.

Drilling Posts.
Keystone Mfg. Co., Buffalo, N.Y.

Drills, Bench.
W. F. & John Barnes Co., Rockford.
Can. Buffalo Forge Co., Montreal.
Can. Fairbanks-Morse Co., Montreal.
Pratt & Whitney Co., Dundas, Ont.
United States Electrical Tool Co Cincinnati.

Drills, Blacksmith and Bit Stock.
Can. Buffalo Forge Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill and Machine Co., New Bedford.
Wilt Twist Drill Co. of Canada, Ltd Walkerville, Ont.

Drills, Centre.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill and Machine Co. New Bedford.
Pratt & Whitney Co., Dundas, Ont.
L. S. Starrett Co., Athol, Mass.
Wilt Twist Drill Co., of Canada, Ltd., Walkerville, Ont.

Drills Corner (Pneumatic).
Cleveland Pneumatic Tool Co. of Canada, Toronto.

Drills, Electric and Portable.
A. R. Williams Machy. Co., Toronto.
Can. Buffalo Forge Co., Montreal.
Niles-Bement-Pond Co., New York.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati, O.

Drills, High Speed.
Baker Bros., Toledo, O.
Cleveland Twist Drill Co., Cleveland.
Can. Fairbanks-Morse Co., Montreal.
Morse Twist Drill and Machine Co., New Bedford.
W. F. & John Barnes Co., Rockford, Ill.
Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co., of Canada, Ltd., Walkerville, Ont.

Drills, Multiple Spindle.
Pratt & Whitney Co., Dundas, Ont.
Niles-Bement-Pond Co., New York.

Drills, Oil Tube.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill and Machine Co. New Bedford.

Drills, Pneumatic.
John F. Allen Co., New York.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.

Drills, Ratchet and Hand.
Armstrong Bros. Tool Co., Chicago.
Can. Buffalo Forge Co., Montreal.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill and Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Drills, Rock.
A. R. Williams Machy. Co., Toronto.
Cleveland Pneumatic Tool Co. of Canada, Toronto.

Drills, Track.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill and Machine Co., New Bedford.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Drills, Twist.
Armstrong, Whitworth of Canada, Ltd., Montreal.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
John Morrow Screw Co., Ingersoll, Ont.
Morse Twist Drill and Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Drill Holders.
Wells Brothers Co., Greenfield, Mass.

Drill Sockets.
Modern Tool Co., Erie, Pa.
Morse Twist Drill and Machine Co., New Bedford.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Drying Appliances.
Can. Buffalo Forge Co., Montreal.
Can. Sirocco Co., Ltd., Windsor, Ont.
Sheldons, Ltd., Galt, Ont.

Drying Out Barrels.
Baird Machine Co., Bridgeport, Conn.

Drying Ovens.
Oven Equipment & Mfg. Co., New Haven, Conn.
Whiting Foundry Equipment Co., Harvey, Ill.

Dump Cars.
Can. Fairbanks-Morse Co., Montreal.
National Machinery & Supply Co., Hamilton, Ont.
Owen Sound Iron Works Co., Owen Sound.
Plessisville Foundry, Plessisville, Que.

Dust Separators.
Can. Buffalo Forge Co., Montreal.
Sheldons, Ltd., Galt, Ont.

Dust Arresters (for Tumbling Mills).
Whiting Foundry Equipment Co., Harvey, Ill.

Dynamos and Electrical Supplies.
A. R. Williams Machy. Co., Toronto.
Can. Fairbanks-Morse Co., Montreal.
Lancashire Dynamo and Motor Co., Ltd., Toronto.
Toronto & Hamilton Electric Co., Hamilton, Ont.

Electrical Supplies.
Duncan Electrical Co., Montreal.
Lintz-Porter Co., Toronto.

Elevator Enclosures.
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ont.

Elevating and Conveying Machinery.
Can. Mathews Gravity Co., Toronto.
Plessisville Foundry, Plessisville, Que.

Emery Grinders (Pneumatic).
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Stow Mfg. Co., Binghamton, N.Y.

Emery and Emery Wheels.
Can. Fairbanks-Morse Co., Montreal.
Canadian Hart Wheels, Hamilton, Ont.
Ford-Smith Machine Co., Hamilton.
Garvin Machine Co., New York.
Girard Machine & Tool Co., Philadelphia, Pa.
Stevens, F. B., Detroit, Mich.

Emery Wheels, Dressers and Stands.
Canadian Hart Wheels, Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
General Supply Co. of Canada, Ltd., Ottawa.
National Machinery & Supply Co. Hamilton, Ont.
Norton Co., Worcester, Mass.

Emery Wheel Safety Flanges.
Canadian Hart Wheels, Hamilton, Ont.

Enameling Ovens.
Oven Equipment & Mfg. Co., New Haven, Conn.

Engines, Corliss, Compound, Pumping.
Mesta Machine Co., Pittsburg, Pa.
Wm. Tod Company, Youngstown, O.

Engines, Gas and Gasoline.
Can. Fairbanks-Morse Co., Montreal.
Jones & Glassco, Montreal.
Mesta Machine Co., Pittsburg, Pa.
National Machinery & Supply Co., Hamilton.
Wm. Tod Company, Youngstown, O.

Engines, Horizontal and Vertical.
Can. Buffalo Forge Co., Montreal.
Can. Sirocco Co., Ltd., Windsor, Ont.
Mesta Machine Co., Pittsburg, Pa.
A. R. Williams Machy. Co., Toronto.
Sheldons, Ltd., Galt, Ont.
Wm. Tod Co., Youngstown, O.

Engines, High-Speed, Automatic.
Can. Buffalo Forge Co., Montreal.

Engines, Steam.
Can. Buffalo Forge Co., Montreal.
General Supply Co. of Canada, Ltd., Ottawa.
Mesta Machine Co., Pittsburg, Pa.
Plessisville Foundry, Plessisville, Que.
Southwark Foundry & Machine Co., Philadelphia, Pa.
Wm. Tod Company, Youngstown, O.

Engines, Stationary and Marine.
Southwark Foundry & Machine Co., Philadelphia, Pa.

Engineering Books.
The MacLean Publishing Co., Ltd., Toronto.

Engraving Machines.
Geo. Gorton Machine Co., Racine, Wis.

Elevators and Buckets.
Eastern Machinery Co., New Haven Conn.
Whiting Foundry Equipment Co., Harvey, Ill.

Equipment Shop.
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.
Wm Tod Co., Youngstown, O.

Escutcheon Pins.
Parmenter & Bulloch Co., Gananoque.

Evaporators' Machinery.
Brown Boggs & Co., Hamilton, Can.

Exhaust Heads and Hoods.
Can. Buffalo Forge Co., Montreal.
Can. Steel Products Co., Montreal.
Can. Fairbanks Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

Exhausters.
Can. Buffalo Forge Co., Montreal.
Can. Sirocco Co., Ltd., Windsor, Ont.

Experimental Machinery.
Owen Sound Iron Works Co., Owen Sound.

Extractors, Ingot.
Mesta Machine Co., Pittsburg, Pa.

Fans.
Can. Buffalo Forge Co., Berlin, Ont.
Baird Machine Co., Bridgeport, Conn.
Can. Sirocco Co., Ltd., Windsor, Ont.
Lintz-Porter Co., Toronto.
Plessisville Foundry, Plessisville, Que.
Sheldons, Ltd., Galt, Ont.
The Smart-Turner Machine Co., Hamilton.

Feed Water Heaters.
Can. Fairbanks-Morse Co., Montreal.
The Smart-Turner Machine Co., Hamilton.

Fence, Iron Factory.
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works Co., Ltd., London, Canada.
Standard Tube & Fence Co., Woodstock, Ont.

Files.
Delta File Works, Philadelphia, Pa.
Nicholson File Co., Port Hope, Ont.

Fire Alarm Apparatus.
Lintz-Porter Co., Toronto.

Fire Brick.
Elk Fire Brick Co., Hamilton, Ont.

Fire Extinguishers.
Can. H. W. Johns-Manville Co. Limited, Toronto.
General Supply Co. of Canada, Ltd., Ottawa.

Fire Escapes.
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ont.

Flash Lamps.
Lintz-Porter Co., Toronto.

Flexible Shafts.
Chicago Flexible Shaft Co., Chicago, Ill.
Stow Mfg. Co., Binghamton, N.Y.

Flumes.
Toronto Iron Works, Ltd., Toronto.

Foot Valves.
Smart-Turner Mach. Co., Hamilton.

Forges, Hand, etc.
Can. Buffalo Forge Co., Montreal.
Independent Pneumatic Tool Co., Chicago, Ill.
National Machinery & Supply Co. Hamilton.
Sheldons, Limited, Galt, Ont.

Forgings, Drop, Automobile and Locomotive.
Bliss, E. W., Co., Brooklyn, N.Y.
Canadian Billings & Spencer, Ltd., Welland.
Mesta Machine Co., Pittsburg, Pa.
J. H. Williams Co., Brooklyn, N.Y.

Forging Hammers, Belt-Driven.
Bliss, E. W., Co., Brooklyn, N.Y.
Plessisville Foundry, Plessisville, Que.

Forging Hammers, Steam.
Erie Foundry Co., Erie, Pa.

Forging Machinery.
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton Canada.
National Machinery Co., Tiffin, Ohio.
Plessisville Foundry, Plessisville, Que.
Wm. Tod Company, Youngstown, O.
Watson-Stillman Co., Aldene, N.J.

Foundry Equipment.
Northern Crane Works, Walkerville.
W. W. Sly Mfg. Co., Cleveland, O.
Whiting Foundry Equipment Co., Harvey, Ill.

Friction Leathers.
Graton & Knight Mfg. Co., Montreal.

Friction Clutch Pulleys, etc.
American Pulley Co., Philadelphia, Pa.
Baird Machine Co., Bridgeport, Conn.
Eastern Machinery Co., New Haven, Conn.
Owen Sound Iron Works Co., Owen Sound.
Positive Clutch & Pulley Works, Toronto.

Furnace Engineers and Contractors.
Mechanical Engineering Co., Montreal.
Whiting Foundry Equipment Co. Harvey, Ill.

Furnaces, Blast.
Toronto Iron Works, Ltd., Toronto.

Furnaces, Oil, Coal, Gas and Electric.
Canadian Hoskins, Limited, Walkerville, Ont.
Chicago Flexible Shaft Co., Chicago Ill
Mechanical Engineering Co., 55 Cote St., Montreal, Que.
Tate, Jones & Co., Pittsburgh, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

Furnaces, Steel Heating and Brass Melting.
Can. Hoskins, Ltd., Walkerville, Ont.
Chicago Flexible Shaft Co., Chicago Ill
Mechanical Engineering Co., 55 Cote St., Montreal, Que.
Tate, Jones & Co., Pittsburgh, Pa.
Whiting Foundry Equipment Co. Harvey, Ill.

We are Headquarters for:

Shell Marking Machines
Nosing Presses
Stamping Presses
Drop Hammers
Sheet Metal Workers' Tools

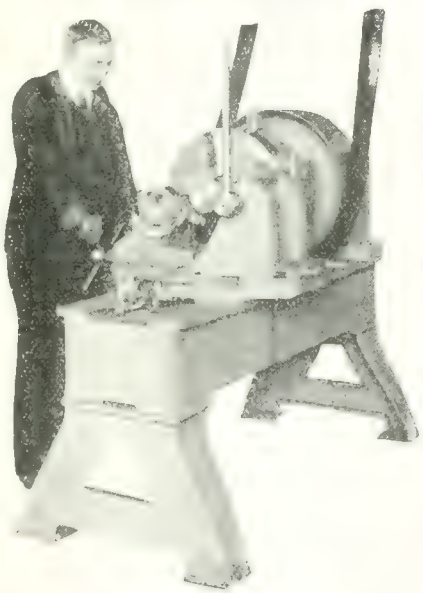
The Brown, Boggs Company, Limited, Hamilton, Canada

Tinsmiths' Tools, Sheet Metal Working Machinery, etc.

WESTERN AGENTS: Messrs. Bissett & Webb, Limited, Winnipeg and Edmonton

Special Purpose Lathes

For Finishing Copper Driving Bands on Ammunition



This half tone illustrates one of our single purpose lathes in service at a munitions factory in Great Britain—finishing the driving band on 60 pdr. High Explosive Shells. This factory is using five of our machines equipped with standard three jaw chucks, compressed air being unobtainable.

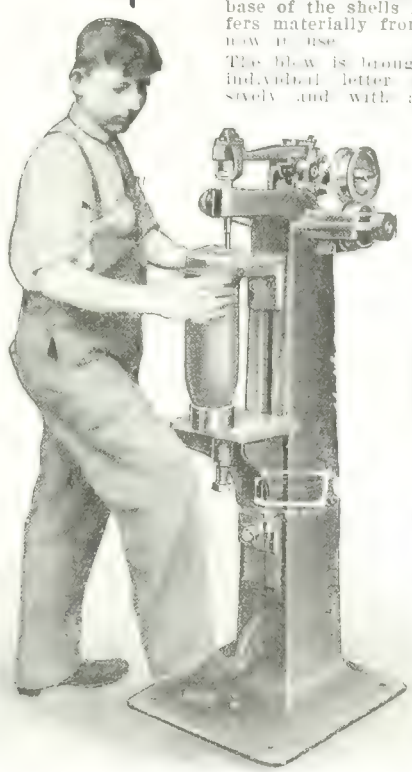
Write nearest branch office for descriptive prints and deliveries.

The Jenckes Machine Co., Limited

SHERBROOKE, QUEBEC

Branches at Toronto, Ontario, 728 Traders Bank Bldg.; Montreal, Que., 303 E. T. Bank Building; St. Catharines, Ont.; Cobalt, Ont.; Vancouver, B.C.; Nelson, B.C.

Marking High Explosive Shells



The device employed in marking the base of the shells in this machine differs materially from any other method now in use.

The blow is brought to bear on each individual letter and figure successively and with absolute uniformity.

Adjustable to give shallow or deep impression.

FIFTEEN SECONDS' TIME for marking perfectly one Shell. For 18 pound, 45" and 60 pound Shells.

Cut Showing Marking on Shell

Full particulars on request.

The Grant Mfg. and Machine Co.

Bridgeport, Conn.

Furnaces, Heat Treating, Hardening and Tempering.
Can. Hoskins, Ltd., Walkerville, Ont.
Chicago Flexible Shaft Co., Chicago, Ill.
Mechanical Engineering Co., 55 Cote St., Montreal, Que.
Tate, Jones & Co., Pittsburgh, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

Furnaces, Forging.
Mechanical Engineering Co., Montreal.
Whiting Foundry Equipment Co. Harvey, Ill.

Furnaces, Annealing, etc.
Can. Hoskins, Ltd., Walkerville, Ont.
Chicago Flexible Shaft Co., Chicago, Ill.
Mechanical Engineering Co., 55 Cote St., Montreal, Que.
Tate, Jones & Co., Pittsburgh, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

Furnaces for Baking, Bluing, Drying, Enameling, Japanning and Lacquering.
Mechanical Engineering Co., Montreal.
Oven Equipment & Mfg. Co., New Haven, Conn.

Furnace Lining.
Can. H. W. Johns-Manville Co., Limited, Toronto.
Mechanical Engineering Co., Montreal.

Fuse Cap Machinery.
Noble & Westbrook Mfg. Co., Hartford, Conn.

Gang Planer Tools.
Armstrong Bros. Tool Co., Chicago.

Gaskets, Leather, etc.
Graton & Knight Mfg. Co., Montreal.
Can. H. W. Johns-Manville Co., Limited, Toronto.

Gas Blowers and Exhausters.
Can. Buffalo Forge Co., Montreal.
Can. Sirocco Co., Ltd., Windsor, Ont.
Sheldons, Limited, Galt.
Southwark Foundry & Machine Co., Philadelphia, Pa.

Gas Burners.
Oven Equipment & Mfg. Co., New Haven, Conn.

Gas Machines.
Brown, Boggs & Co., Hamilton Can

Gas Producer Plants.
Can. Fairbanks-Morse Co., Montreal.

Gauges, Hydraulic Pressure.
Charles F. Elmes Eng. Works, Chicago
Watson-Stillman Co., Aldene, N.J.

Gauges, Standard.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Greenfield Tap & Die Corporation, Greenfield, Mass.
Holden-Morgan Co., Toronto.
Morse Twist Drill and Machine Co., New Bedford.
Pratt & Whitney Co., Hartford, Conn.
Garvin Machine Co., New York.
National Machinery & Supply Co., Hamilton.
Southwark Foundry & Machine Co., Philadelphia.

Gear-Cutting Machinery.
Girard Machine & Tool Co., Philadelphia, Pa.
Hamilton Gear & Machine Co., Toronto.
Hill, Clarke & Co., of Chicago, Chicago, Ill.
Motch & Merryweather Machy. Co., Cleveland, O.
National Machinery & Supply Co., Hamilton.
A. R. Williams Machy. Co., Toronto.
Sheldons, Limited, Galt, Ont.
The Smart-Turner Machine Co., Hamilton.
Wm. Tod Co., Youngstown, O.
D. E. Whiton Machine Co., New London, Conn.

Gears, Cut, Mortise, Angle, Worm.
Gardner, Robt., & Son, Montreal.
Hamilton Gear & Machine Co., Toronto.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
Jones & Glassco, Montreal, P.Q.
Mesta Machine Co., Pittsburg, Pa.
Philadelphia Gear Works, Philadelphia, Pa.
Smart-Turner Machine Co., Hamilton, Ont.
Wm. Tod Co., Youngstown, O.

Gears, Rawhide.
Gardner, Robt., & Son, Montreal.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal, P.Q.
Philadelphia Gear Works, Philadelphia, Pa.
Smart-Turner Machine Co., Hamilton, Ont.

Generators, Electric.
A. R. Williams Machy. Co., Toronto.
Can. Fairbanks Morse Co., Montreal.
Lancashire Dynamo and Motor Co., Ltd., Toronto.
Toronto and Hamilton Electric Co., Hamilton.

Grain for Polishing.
Norton Co., Worcester, Mass.

Graphite.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Jos. Dixon Crucible Co., Jersey City.
Stevens, F. B., Detroit, Mich.

Grinders, Automatic Knife.
W. H. Banfield & Son, Toronto.

Grinders, Centre, Pedestal and Bench.
Canadian Hart Wheels, Ltd., Hamilton, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Ford-Smith Machine Co., Hamilton.
Foss & Hill Machy. Co., Montreal.
Gray Mfg. & Machine Co., Toronto.
Niles-Bement-Pond Co., New York.
Modern Tool Co., Erie, Pa.
Morse Twist Drill and Machine Co., New Bedford.
New Britain Machine Co., New Britain, Conn.
Norton Grinding Co., Worcester, Mass.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati, O.

Grinders, Cutter.
Brown & Sharpe Mfg. Co., Providence, R.I.
Foss & Hill Machy. Co., Montreal.
Greenfield Machine Co., Greenfield, Mass.
Pratt & Whitney Co., Dundas, Ont.

Grinders, Die Chaser.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.

Grinders, Disk.
Armstrong Bros. Tool Co., Chicago, Ill.
Gardner Machine Co., Beloit, Wis.
Norton Grinding Co., Worcester, Mass.

Grinders, Drill.
Garvin Machine Co., New York.
United States Electric Tool Co., Cincinnati, O.

Grinders, Cylinder, Internal.
Brown & Sharpe Mfg. Co., Providence, R.I.
Foss & Hill Machy. Co., Montreal.
Girard Machine & Tool Co., Philadelphia, Pa.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Greenfield Machine Co., Greenfield, Mass.
Hill, Clarke & Co. of Chicago, Chicago, Ill.
Landis Tool Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Motch & Merryweather Machy. Co., Cleveland, O.
Norton Grinding Co., Worcester, Mass.
Rivett Lathe & Grinder Co., Boston, Mass.

Grinders, Electric.
Klintz-Porter Co., Toronto.

Grinders, Pneumatic.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago, Ill.

Grinders, Portable, Electric, Hand, Tool, Post, Floor and Bench.
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Foss & Hill Machy. Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Greenfield Machine Co., Greenfield, Mass.
Hill, Clarke & Co. of Chicago, Chicago, Ill.
Hisey-Wolf Machine Co., Cincinnati, O.
Landis Tool Co., Waynesboro, Pa.
Motch & Merryweather Machy. Co., Cleveland, O.
Norton Co., Worcester, Mass.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machy. Co., Toronto.

Grinders, Swing, Portable, Electric.
Hisey-Wolf Machine Co., Cincinnati, O.
United States Electrical Tool Co., Cincinnati.

Grinders, Tool and Holders.
Armstrong Bros. Tool Co., Chicago.
W. F. & John Barnes Co., Rockford, Ill.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Greenfield Machine Co., Greenfield, Mass.
Hill, Clarke & Co. of Chicago, Chicago, Ill.
Motch & Merryweather Machy. Co., Cleveland, O.
Tabor Mfg. Co., Philadelphia, Pa.

Grinders, Universal, Plain.
Girard Machine & Tool Co., Philadelphia, Pa.
Landis Tool Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.

Grinders, Vertical Surface.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Girard Machine & Tool Co., Philadelphia, Pa.
Pratt & Whitney Co., Dundas, Ont.

Grinding and Polishing Machines, Portable, Pneumatic and Spring Frame.
Can. Fairbanks-Morse Co., Montreal.
Canadian Hart Wheels, Ltd., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Girard Machine & Tool Co., Philadelphia, Pa.
Gray Mfg. & Machine Co., Toronto.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford.
Hill, Clarke & Co. of Chicago, Chicago, Ill.
Motch & Merryweather Machy. Co., Cleveland, O.
Niles-Bement-Pond Co., New York.
Norton Co., Worcester, Mass.
Stow Mfg. Co., Binghamton, N.Y.

Grinding Wheels.
Can. Fairbanks-Morse Co., Montreal
Canadian Hart Wheels, Ltd., Hamilton, Ont.
Carborundum Co., Niagara Falls.
Ford-Smith Machine Co., Hamilton, Canada.
Gray Mfg. & Machine Co., Toronto.
Norton Co., Worcester, Mass.

Guards, Window and Machine.
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works Co., Ltd., London, Canada.

Hack Saw Blades.
E. C. Atkins & Co., Hamilton, Ont.
Victor Saw Works, Ltd., Hamilton, Canada.
Diamond Saw & Stamping Works, Buffalo, N.Y.
Racine Tool & Machine Co., Racine, Wis.
L. S. Starrett Co., Athol, Mass.

Hack Saw Frames.
Ford-Smith Machine Co., Hamilton, Canada.
Garvin Machine Co., New York City.
Mussens, Limited, Montreal.

Hammer High Speed.
High Speed Hammer Co., Rochester, N.Y.

Hammers, Drop and Belt Driven.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton Canada.
Canadian Billings & Spencer, Ltd., Welland.
A. B. Jardine & Co., Hespeler, Ont.
Girard Machine & Tool Co., Philadelphia, Pa.
National Machinery & Supply Co., Hamilton.
Niles-Bement-Pond Co., New York.
Plessisville Foundry, Plessisville, Que
Toledo Machine & Tool Co., Toledo.

Hammers, Helve Power.
West Tire Setter Co., Rochester, N.Y.

Hammers, Pneumatic.
Cleveland Pneumatic Tool Co., of Canada, Toronto.

Hammers, Steam.
John Bertram & Sons Co., Dundas.
Girard Machine & Tool Co., Philadelphia, Pa.
National Machinery & Supply Co., Hamilton.
Niles-Bement-Pond Co., New York.

Hand Hoists & Trolleys.
Whiting Foundry Equipment Co., Harvey, Ill.

Hand Leathers or Pads.
Graton & Knight Mfg. Co., Montreal.

Hangers.
Baird Machine Co., Bridgeport, Conn.
Gardner, Robt., & Son, Montreal
General Supply Co. of Canada Ltd., Ottawa.
The Smart-Turner Machine Co., Hamilton.

Hardness Testing Instruments.
Shore Instrument & Mfg. Co., New York.

Heating and Ventilating Engineers.
Can. Buffalo Forge Co., Montreal.
Can. Sirocco Co., Ltd., Windsor, Ont.
Sheldons, Ltd., Galt, Ont.

Heat Gauges, Hardening and Annealing.
Shore Instrument & Mfg. Co., New York.

Hide ...
L. S. Tarshis & Sons, Montreal

Hinge Machinery.
Baird Machine Co., Bridgeport, Conn.

Hinges.
London Bolt & Hinge Works, London, Ont.

Hoists, Hydraulic.
Southwark Foundry & Machine Co., Philadelphia.
Watson-Stillman Co., Aldene, N.J.

Hoisting and Conveying Machinery.
General Supply Co. of Canada, Ltd., Ottawa.
Northern Crane Works, Walkerville.
Owen Sound Iron Works Co., Owen Sound.
Southwark Foundry & Machine Co., Philadelphia.
Whiting Foundry Equipment Co., Harvey, Ill.

Hoists, Chain, Electric and Pneumatic.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co. Harvey, Ill.

Hoists, Electric.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

Hoppers.
Toronto Iron Works, Ltd., Toronto.

Hose Clamp Tool.
Cleveland Pneumatic Tool Co. of Canada, Toronto.

Hose, Pneumatic.
Cleveland Pneumatic Tool Co., of Canada, Toronto.

Hose, Steam, Suction and Water.
Can. H. W. Johns-Manville Co., Limited, Toronto.

Holders for Dies and Drills.
Wells Brothers, Company, Greenfield, Mass.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Horsehair.
L. S. Tarshis & Sons, Montreal.

Hydraulic Accumulators.
Can. Boomer & Boschert Press Co., Montreal.
Can. Fairbanks-Morse Co., Montreal.
Mesta Machine Co., Pittsburgh.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
The Smart-Turner Machine Co., Hamilton.
Southwark Foundry & Machine Co., Philadelphia.
Watson-Stillman Co., Aldene, N.J.

Hydraulic Machinery.
Can. Boomer & Boschert Press Co., Montreal.
Charles F. Elmes Eng. Works, Chicago.
Mesta Machine Co., Pittsburgh.
Niles-Bement-Pond Co., New York.
National Machinery & Supply Co., Hamilton.
William R. Perrin, Ltd., Toronto.
Southwark Foundry & Machine Co., Philadelphia.
Wm. Tod Co., Youngstown, O.
Watson-Stillman Co., Aldene, N.J.

Indicators, Speed.
Brown & Sharpe Mfg. Co., Providence, R.I.
L. S. Starrett Co., Athol, Mass.

Index Centres.
Fred. C. Dickow, Chicago, Ill.
Garvin Machine Co., New York.

Ingot Metals.
A. C. Leslie & Co., Ltd., Montreal.

Intensifiers.
Mesta Machine Co., Pittsburg, Pa.
Southwark Foundry & Machine Co., Philadelphia.

Iron Filler.
Can. H. W. Johns-Manville Co., Ltd., Toronto.

Iron Ore.
Hanna & Co., M. A., Cleveland, O.

Jacks, Hydraulic.
Charles F. Elmes Eng. Works, Chicago
Southwark Foundry & Machine Co., Philadelphia.
Watson-Stillman Co., Aldene, N.J.

Jacks.
Can. Fairbanks-Morse Co., Montreal.
Northern Crane Works, Walkerville.
Norton, A. O., Coaticook, Que.
Plessisville Foundry, Plessisville, Que.

Jacks, Pneumatic.
Northern Crane Works, Walkerville.

Jacks, Pit and Track.
Can. Fairbanks-Morse Co., Montreal.
Northern Crane Works, Walkerville.
Watson-Stillman Co., Aldene, N.J.

Japanning Ovens.
Oven Equipment & Mfg. Co., New Haven, Conn.

Jaws, Face Plate.
Cushman Chuck Co., Hartford, Conn.
Skinner Chuck Co., New Britain, Conn.

IN STOCK

4...26" swing x 16' Whitcomb-Blaisdell special heavy type Engine Lathes with double back gears, four step cone, 4¼ in. belt. Quick change gears, compound rest, special heavy taper attachment. Fitted with 24" heavy Westcott chucks. Machines good as new.

1...2¼" National Acme latest pattern four spindle Automatic Screw Machine, arranged for motor drive.

1...¾" National Acme Automatic Four Spindle Screw Machine, latest pattern, arranged for motor drive.

Write or wire for prices.

Marshall & Huschart Machinery Co.
CHICAGO

FREE

This Brochur Takes the Place of a

personal trip through our shops.

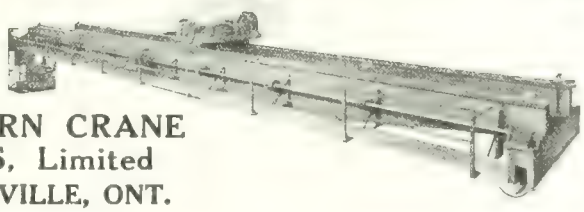
The actual scenes from the factories, and the few words of explanation, tell the things you wish to know.

The whole story is interestingly told without taking up much of your time.

SENT FREE—NO OBLIGATION

Mention Canadian Machinery

The Globe Machine & Stamping Company
CLEVELAND, OHIO



NORTHERN CRANE WORKS, Limited
WALKERVILLE, ONT.
BUY IN CANADA!

NORTHERN CRANES

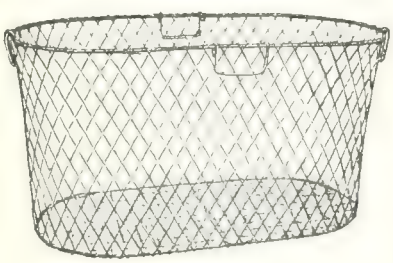
ELECTRIC AND HAND POWER
ALL SIZES, CAPACITIES AND TYPES
ALSO ELECTRIC AND AIR HOISTS
Foundry Equipment—Cupolas, Ladles, Etc.

AUTOMATIC
WOOD SCREW MACHINES

Cable Address:
Cook, Hartford, U.S.A.

Asa S. Cook Co.

Hartford, Conn.



Dipping Baskets

Our Copper Baskets will withstand ACID. Can be made to any shape or size. Draining facilities of our wire baskets are much greater than sheet metal construction.

CANADA WIRE & IRON GOODS COMPANY
Hamilton, Ontario

Jigs, Tools, etc.
Hamilton Gear & Machine Co., Toronto.

Key Seaters.
Baker Bros., Toledo, O.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
A. R. Williams Machy. Co., Toronto.

Kilns.
Can. Buffalo Forge Co., Montreal.
Sheldons, Limited, Galt, Ont.

Laboratories, Inspection and Testing.
Can. Inspection & Testing Laboratories Ltd., Montreal.

Lacquering Ovens.
Oven Equipment & Mfg. Co., New Haven, Conn.

Ladles, Foundry.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

Lag Screw Gimlet Pointers.
National Machy. Co., Tiffin, Ohio.

Lamps, Arc and Incandescent.
Can. Fairbanks-Morse Co., Montreal.
Can. H. W. Johns-Manville Co., Limited, Toronto.
Ker & Goodwin, Brantford.

Lamps, Tungsten.
Lintz-Porter Co., Toronto.

Lathe Chucks.
Ker & Goodwin, Brantford.

Lathe Attachment for Shells.
Lymburner, Ltd., Montreal.

Lathes, Automatic.
Windsor Machine Co., Windsor, Vt.

Lathe Dogs and Attachments.
Armstrong Bros. Tool Co., Chicago.
Fay & Scott, Dexter, Maine.
Hendey Machine Co., Torrington, Conn.
National Forge & Tool Co., Erie, Pa.
J. H. Williams Co., Brooklyn, N.Y.

Lathes, Bench.
W. F. & John Barnes Co., Rockford.
Blount, J. G., & Co., Everett, Mass.
Can. Fairbanks-Morse Co., Montreal.
Pratt & Whitney Co., Dundas, Ont.

Lathes, Band Turning.
Jenckes Machine Co., Sherbrooke, Que.

Lathes, Engine.
Amalgamated Machy. Corporation, Chicago, Ill.
A. R. Williams Machy. Co., Toronto.
W. F. & John Barnes Co., Rockford, Ill.
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Cincinnati Iron & Steel Co., Cincinnati, O.
Fay & Scott, Dexter, Maine.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Machinery, Toronto.
Garvin Machine Co., New York.
Girard Machine & Tool Co., Philadelphia, Pa.
Hendey Machine Co., Torrington, Conn.
Hill, Clarke & Co., of Chicago, Ill.
R. McDougall Co., Galt.
Motch & Merryweather Machy. Co., Cleveland, O.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.

Lathe Pans.
New Britain Machine Co., New Britain, Conn.

Lathes, Patternmakers'.
J. G. Blount Co., Everett, Mass.
Fay & Scott, Dexter, Maine.
Foss & Hill Machy. Co., Montreal.
Garlock-Machinery, Toronto.
Mussens, Limited, Montreal.

Lathes, Roll Turning
Mesta Machine Co., Pittsburgh.

Lathes, Screw Cutting.
A. R. Williams Machy. Co., Toronto.
John Bertram & Sons Co., Dundas.
Cincinnati Iron & Steel Co., Cincinnati, O.
Girard Machine & Tool Co., Philadelphia, Pa.
Motch & Merryweather Machy. Co., Cleveland, O.
Niles-Bement-Pond Co., New York.

Lathes, Spinning.
Bliss, E. W., Co., Brooklyn, N.Y.
Toledo Mach. & Tool Co., Toledo, O.

Lathe, Turret and Speed.
John Bertram & Sons Co., Dundas.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Cincinnati Iron & Steel Co., Cincinnati, O.
Colburn Machine Tool Co., Franklin, Pa.
Fay & Scott, Dexter, Maine.
Foss & Hill Machy. Co., Montreal.
Garlock-Machinery, Toronto.
Garvin Machine Co., New York.
Girard Machine & Tool Co., Philadelphia, Pa.
Motch & Merryweather Machy. Co., Cleveland, O.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
Windsor Machine Co., Windsor, Vt.
A. R. Williams Machy. Co., Toronto.

Leather Strapping.
Graton & Knight Mfg. Co., Montreal.

Lifts, Pneumatic.
Whiting Foundry Equipment Co., Harvey, Ill.

Lighting Fixtures.
Lintz-Porter Co., Toronto.

Link Belting.
Can. Fairbanks-Morse Co., Montreal.
Graton & Knight Mfg. Co., Montreal.
Jones & Glassco, Montreal.

Linoleum Mill Machinery.
Bertrams, Ltd., Edinburgh, Scotland.

Liquid Air.
L'Air Liquide Society, Montreal, Toronto.
Lever Bros., Toronto.

Lockers, Steel Wardrobe and Steel Material.
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works Co., Ltd., London, Canada.

Lockers.
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works Co., Ltd., London, Canada.

Locomotive Equipment.
Can. Locomotive Co., Kingston, Ont.

Locomotives, Railroading, Contracting.
Can. Locomotive Co., Kingston, Ont.
National Machinery & Supply Co., Hamilton.

Lubricants.
S. F. Bowser & Co., Fort Wayne, Ind.
Can. Economic Lubricant Co., Montreal.
Can. Oil Company, Toronto.
Cataract Refining Co., Toronto.
Crescent Oil Co., Inc., New York.

Machine Tools.
Amalgamated Machy. Corporation, Chicago, Ill.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Can. Machinery Corp., Galt, Ont.
Garlock-Machinery, Toronto.
General Supply Co. of Canada, Ltd., Ottawa.
Modern Tool Co., Erie, Pa.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
J. H. Williams Co., Brooklyn, N.Y.

Machinery Dealers.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Machinery, Toronto.
Hill, Clarke & Co., of Chicago.
Marshall & Huschart Machinery Co., Chicago.
National Machinery & Supply Co., Hamilton.
Frank Toomey, Inc., New York.
A. R. Williams Machy. Co., Toronto
New York Machinery Exchange, New York.

Machinery Guards.
Jones & Glassco, Montreal, P.Q.
Canada Wire & Iron Goods Co. Hamilton Ont.
A. R. Williams Machy. Co., Toronto.

Machinery Repairs.
Cunningham & Sons, St. Catharines, Ont.
Plessisville Foundry, Plessisville, Que.

Machinists' Scales, Small Tools and Supplies.
Can. Fairbanks-Morse Co., Montreal.
Frank H. Scott, Montreal.
J. H. Williams & Co., Brooklyn, N.Y.

Magnetos.
Lintz-Porter Co., Toronto.

Mandrels.
Can. Fairbanks-Morse Co., Montreal
Cleveland Twist Drill Co., Cleveland.
A. R. Jardine & Co., Hespeler, Ont.
Morse Twist Drill and Machine Co., New Bedford
Pratt & Whitney Co., Dundas, Ont.
Wilt Twist Drill Co. of Canada, Ltd. Walkerville, Ont.

Marine Engines.
Cunningham & Sons, St. Catharines, Ont.

Marking Machinery.
Brown, Boggs Co., Hamilton, Ont.
Noble & Westbrook Mfg. Co., Hartford, Conn.

Marquises.
Dennis Wire & Iron Works, London, Ont.

Measuring Tapes and Rules.
James Chesterman & Co., Ltd., Sheffield, Eng.

Metallurgists.
Can. Inspection & Testing Laboratories, Ltd., Montreal
Toronto Testing Laboratory, Ltd., Toronto.

Metals.
L. S. Tashis & Sons, Montreal

Metal Cutting Machines.
Hurlbut, Rogers Machinery Co., South Sudbury, Mass.
Racine Tool & Machine Co., Racine, Wis.

Metal Stamping.
Duncan Electrical Co., Montreal.

Meters, Electrical.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Lintz-Porter Co., Toronto.

Mill Machinery.
Cunningham & Sons, St Catharines, Ont.
Alexander Fleck, Ltd., Ottawa.

Milling Attachments.
John Bertram & Sons Co., Dundas.
Brown & Sharpe Mfg. Co., Providence.
Cincinnati Milling Machine Co., Cincinnati.
Hendey Mach. Co., Torrington, Conn.
Kempsmith Mfg. Co. Milwaukee, W.
Mesta Machine Co., Pittsburg, Pa.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Rockford Milling Machine Co., Rockford, Ill.

Milling Machines, Horizontal and Vertical.
A. R. Williams Machy. Co., Toronto.
Brown & Sharpe Mfg. Co., Providence.
Hill, Clarke & Co. of Chicago, Chicago, Ill.
John Bertram & Sons Co., Dundas.
Foss & Hill Machy. Co., Montreal.
Girard Machine & Tool Co., Philadelphia, Pa.
Gooley & Edlund, Cortland, N.Y.
Kempsmith Mfg. Co., Milwaukee, W.
Motch & Merryweather Machy. Co., Cleveland, O.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Rockford Milling Machine Co., Rockford, Ill.

Milling Machines, Plain, Bench and Universal.
Brown & Sharpe Mfg. Co., Providence, R.I.
Cincinnati Milling Machine Co., Cincinnati.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Gooley & Edlund, Cortland, N.Y.
Hill, Clarke & Co., of Chicago, Chicago, Ill.
Hendey Machine Co., Torrington.
Kempsmith Mfg. Co., Milwaukee, Wis.
Mesta Machine Co., Pittsburg, Pa.
Motch & Merryweather Machy. Co., Cleveland, O.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Rockford Milling Machine Co., Rockford, Ill
A. R. Williams Machy. Co., Toronto.

Milling Machines, Profile.
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Girard Machine & Tool Co., Philadelphia, Pa.
Mesta Machine Co., Pittsburg, Pa.
Motch & Merryweather Machy. Co., Cleveland, O.
Pratt & Whitney Co., Dundas, Ont.

Milling Tools.
Brown & Sharpe Mfg. Co., Providence.
Geometric Tool Co. New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, W.

Mine Cars and Hitchings.
Pratt & Whitney Co., Dundas, Ont.
Modern Tool Co., Erie, Pa.
Can. Fairbanks-Morse Co., Montreal.

Mining Machinery.
A. R. Williams Machy. Co., Toronto.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Pneumatic Tool Co., of Canada, Toronto.
Toronto & Hamilton Electric Co., Hamilton, Ont.

Mixers, Hot Metal.
Mesta Machine Co., Pittsburg, Pa.

Mortising Machines.
Jones & Glassco, Montreal.

Motors, Electric
A. R. Williams Machy. Co., Toronto.
Can. Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
Lintz-Porter Co., Toronto.
Toronto & Hamilton Electric Co., Hamilton, Ont.

Motors, Pneumatic.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago.

Multiple Index Centres.
Garvin Machine Co., New York.

Nipple Threading Machines.
John H. Hall & Sons, Ltd., Brantford, Ont.
Landis Machine Co., Waynesboro, Pa.

Nitrogen.
L'Air Liquide Society, Montreal, Toronto.
Lever Bros., Toronto.

Nozzles, Spray.
Can. Buffalo Forge Co., Montreal.

Nuts, Semi-Finish and Finished.
Galt Machine Screw Co., Galt, Ont.

Nut Burring Machines.
National Machy. Co., Tiffin, O.
National Mach. & Sup. Co., Hamilton

Nut Machines (Hot).
National Machy. Co., Tiffin, O.

Nut Facing and Bolt Shaving Machines.
Garvin Machine Co., New York.
National Machy. Co., Tiffin, O.
National Mach. & Sup. Co., Hamilton

Nut Tappers.
John Bertram & Sons Co., Dundas.
Garvin Machine Co., New York.
Greenfield Tap & Die Corporation, Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. R. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machy. Co., Tiffin, O.
National Mach. & Sup. Co., Hamilton

Nut Wrenches.
Wells Brothers Co., Greenfield, Mass.

Oil Separators.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.
Smart-Turner Machine Co., Hamilton.

Oil Stones.
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

Ovens for Baking, Bluing, Drying, Enamelling, Japanning, and Lacquering.
Geo. Gorton Machine Co., Racine, Wis.
Oven Equipment & Mfg. Co., New Haven, Conn.
Whiting Foundry Equipment Co. Harvey, Ill.

Oven Trucks, Steel.
Oven Equipment & Mfg. Co., New Haven, Conn.

Ovens for Drying, Temper and Under Trucks.
Oven Equipment & Mfg. Co., New Haven, Conn.

Oscillating Valve Grinders (Pneumatic).
Cleveland Pneumatic Tool Co. of Canada, Toronto.

Oxy-Acetylene Welding and Cutting Plants.
L'Air Liquide Society, Montreal, Toronto.
Lever Bros., Toronto.

Oxygen.
L'Air Liquide Society, Montreal, Toronto.
Lever Bros., Toronto.

Packings, Leather, Hydraulics, Etc.
General Supply Co. of Canada, Ltd., Ottawa.
Graton & Knight Mfg. Co., Montreal.
William R. Perrin, Ltd., Toronto.
Southwark Foundry & Machine Co. Philadelphia.

Packing, Rubber, etc.
Can. H. W. Johns-Manville Co., Ltd., Toronto.

Pans, Lathe.
Cleveland Wire Spring Co., Cleveland

Pans, Steel Shop.
Cleveland Wire Spring Co., Cleveland

Paper Mill Machinery.
Bertrams, Ltd., Edinburgh, Scotland.
Can. Sirocco Co., Ltd., Windsor, Ont.

Partitions.
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works Co., Ltd., London, Canada.

Patent Solicitors.
H. J. S. Dennison, Toronto.
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Ross Thomson & Co., Ottawa, Ont.
Harold Shipman & Co., Ottawa.

Patterns.
Galt Malleable Iron Co., Galt.
Guelph Pattern Works, Guelph.
Hamilton Pattern & Foundry Co., Hamilton, Ont.
Owen Sound Iron Works Co., Owen Sound, Ont.
Plessisville Foundry, Plessisville, Que.
Toronto Pattern Works, Toronto.
Wells Pattern & Machine Works, Toronto.

Patterns, Metal and Wood.
Guelph Pattern Works, Guelph, Ont.

Perforated Metals and Ornamental Iron Goods.
Canada Wire & Iron Goods Co., Hamilton.

Phosphor Bronze Castings.
Tallman Brass & Metal Co., Hamilton.

Pickling Machines
Mesta Machine Co., Pittsburgh.

Pig Iron.
Hanna & Co., M. A., Cleveland, O.
Stevens, F. B., Detroit, Mich.

Pinions, Mill Cut.
Mesta Machine Co., Pittsburg, Pa
Wm Tod Co., Youngstown, O.

Steel for Shells!

PROMPT SHIPMENT

Billets and rounds of suitable physical and chemical specification for forging and turning into shrapnel cases and lyddite shells of any size.

LACKAWANNA STEEL COMPANY

Standard structural shapes,
Standard heavy and light rails,
Sheared and universal mill plates,
Sheet bars, and Lackawanna
Sheet Steel Piling.

General Sales Offices: LACKAWANNA, ERIE CO., N.Y.

Canadian Correspondents:
H. A. DRURY & CO., LTD., 309 Craig St. W., MONTREAL

THIS service stands for more than the marketing of products that pertain to your work. It reaches further than the mere selling of merchandise.

With every J-M product you buy there is an obligation on our part to make good a complete responsibility for its performance.

This is what makes Johns-Manville Service a complete satisfaction to those who use it.

J-M Asbestos Roofings
J-M Pipe Coverings
J-M Packings
J-M Mastic Flooring
J-M Underground Conduits
J-M Vitribestos Stack Lining
J-M Fireproof Paint
J-M Fire Extinguishers
"Noark" Fuses, etc.

The Canadian H. W. Johns-Manville Co.

LIMITED

Toronto Montreal Winnipeg Vancouver

90

OXYGEN CONTRACTS

are not necessary to obtain **our** lowest rate for your requirements.

Better Oxygen
Lower Cost
Higher Efficiency

Write for particulars.

Lever Bros., Limited

Oxygen Dept.
TORONTO

"Victoria"

PIG IRON

Foundry

Soft and Strong

Malleable

Shipments from
The Canadian Furnace Co.,
Port Colborne, Ont.

M. A. HANNA & Co.

Sales Agents Cleveland

M·A HANNA & Co.

Pipe Cutting and Threading Machines.
A. R Williams Machy. Co., Toronto.
Armstrong Mfg. Co., Bridgeport, Conn.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Girard Machine & Tool Co., Philadelphia, Pa
John H. Hall & Sons, Brantford.
A. R. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Trimont Mfg. Co., Roxbury, Mass.
Williams Tool Co., Erie, Pa.

Pipe Cutters, Rolling.
Armstrong Mfg. Co., Bridgeport, Conn.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
John H. Hall & Sons, Ltd., Brantford, Ont.

Pipe Fittings.
Southwark Foundry & Machine Co. Philadelphia.

Pipe, Riveted Steel.
Toronto Iron Works, Ltd., Toronto.

Pipe Straightening Machines.
Watson-Stillman Co., Aldene, N.J.

Planer Drives, Electrical.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
Niles-Bement-Pond Co., New York.

Planer Jacks.
Armstrong Bros. Tool Co., Chicago.

Planers, Standard and Rotary.
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Girard Machine & Tool Co., Philadelphia, Pa.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.

Planing and Shaping Machinery.
A. R. Williams Machy. Co., Toronto.
Can. Fairbanks-Morse Co. Montreal.
Fay & Scott, Dexter, Maine.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.

Planing Mill Exhausters.
Can. Buffalo Forge Co., Montreal.
Sheldons, Ltd., Galt, Ont.

Pliers
Canadian Billings & Spencer, Ltd Welland.

Pneumatic Tools.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Independent Pneumatic Tool Co., Chicago, New York.

Polishing Machines, Electric and Belt.
Can. H. W. Johns-Manville Co., Toronto.

Portable Vise Stands.
New Britain Machine Co., New Britain, Conn.

Portable Steel Tool Racks
New Britain Machine Co., New Britain, Conn.

Portable Steel Work Stands.
New Britain Machine Co., New Britain, Conn.

Power Plant Equipments.
Can. Fairbanks-Morse Co., Montreal.

Power Transmission.
Mesta Machine Co., Pittsburg, Pa
The Smart-Turner Mach. Co., Hamilton.

Press Screw (Adjustable).
W. F. & John Barnes Co., Rockford.
Wm. R. Perrin, Ltd., Toronto.

Presses, Bench Straightening.
Toledo Machine & Tool Co., Toledo.

Presses for Shells.
Can. Boomer & Boschert Press Co., Montreal
Can. Locomotive Co., Kingston, Ont.
Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.
Charles F. Elmes Eng. Works, Chicago
Foss & Hill Machy. Co., Montreal.
Goldie & McCulloch Co., Galt, Ont.
Mesta Machine Co., Pittsburgh.
William R. Perrin, Ltd., Toronto
Southwark Foundry & Machine Co., Philadelphia, Pa.
Watson-Stillman Co., Aldene, N.J.
West Tire Setter Co., Rochester, N.Y.

Presses, Cam, Toggle, Eyelet.
Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo, O.

Presses, Broaching.
E. W. Bliss Co., Brooklyn, N.Y.
Toledo Machine & Tool Co., Toledo.
Watson-Stillman & Co., Aldene, N.J.

Presses, Drop.
W. H. Banfield & Son, Toronto.
E. W. Bliss Co, Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Boomer & Boschert Press Co., Montreal.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Toledo Machine & Tool Co., Toledo.
Watson-Stillman Co., Aldene, N.J.

Presses, Filter.
Lymburner Ltd., Montreal.
Wm. R. Perrin, Ltd., Toronto.

Presses, Forging.
Can. Boomer & Boschert Press Co., Montreal.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.
Charles F. Elmes Eng. Works, Chicago Ill.
Can. Fairbanks-Morse Co., Montreal.
Girard Machine & Tool Co., Philadelphia, Pa.
Mesta Machine Co., Pittsburg, Pa.
Niles-Bement-Pond Co., New York.
Wm. R. Perrin, Ltd., Toronto.
Southwark Foundry & Machine Co., Philadelphia, Pa.
Wm. Tod Co., Youngstown, O.
Toledo Machine & Tool Co., Toledo.
Watson-Stillman Co., Aldene, N.J.

Presses, Hydraulic.
Can. Boomer & Boschert Press Co., Montreal.
Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.
A. R. Williams Machy. Co., Toronto.
John Bertram & Sons Co., Dundas.
Charles F. Elmes Eng. Works, Chicago, Ill.
Mesta Machine Co., Pittsburg, Pa.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Southwark Foundry & Machine Co., Philadelphia, Pa.
Wm. Tod Company, Youngstown, O
Toledo Machine & Tool Co., Toledo.
Watson-Stillman Co., Aldene, N.J.

Presses, Pneumatic.
Toledo Machine & Tool Co., Toledo.

Presses, Power.
Baird Machine Co., Bridgeport, Conn.
Can. Boomer & Boschert Press Co., Montreal.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
Geo. Gorton Machine Co., Racine.
Girard Machine & Tool Co., Philadelphia, Pa.
William R Perrin, Ltd., Toronto.
Southwark Foundry & Machine Co., Philadelphia, Pa.
Toledo Machine & Tool Co., Toledo.
Watson-Stillman Co., Aldene, N.J.
A. R. Williams Machy. Co., Toronto.

Presses, Scrap Baling.
Can. Boomer & Boschert Press Co., Montreal
William R. Perrin, Ltd., Toronto
Watson-Stillman Co., Aldene, N.J.

Presses, Spring Foot.
Baird Machine Co., Bridgeport, Conn
Toledo Machine & Tool Co., Toledo.
Brown, Boggs & Co., Hamilton, Can.

Presses, Screw.
Can. Boomer & Boschert Press Co. Montreal
Wm. R. Perrin, Ltd., Toronto.

Pressure Regulators.
Can. Fairbanks-Morse Co., Montreal.

Protective Paint.
Jos. Dixon Crucible Co., Jersey City.

Pulleys.
American Pulley Co., Philadelphia, Pa.
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
General Supply Co. of Canada, Ltd., Ottawa.
D. K. McLaren, Ltd., Montreal
Positive Clutch & Pulley Works, Ltd. Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

Pulley Machinery, Drilling and Tapping.
Can. Fairbanks-Morse Co. Montreal.
Niles-Bement-Pond Co., New York.

Pumps, Air.
Mesta Machine Co., Pittsburg, Pa.
Smart Turner Mach. Co., Hamilton.

Pumps, High Pressure.
Charles F. Elmes Eng. Works, Chicago
William R Perrin, Ltd., Toronto
Smart-Turner Mach. Co., Hamilton
Southwark Foundry & Machine Co., Philadelphia.
Watson-Stillman Co., Aldene, N.J.

Pumping Machinery.
A. R. Williams Machy. Co., Toronto.
Can. Buffalo Forge Co., Montreal.
Can. Fairbanks-Morse Co., Montreal.
Darling Brothers, Montreal.
D'Olier Centrifugal Pump & Mach. Co., Philadelphia, Pa.
National Mach. & Sup. Co., Hamilton.
Wm. R. Perrin Co., Toronto.
The Smart-Turner Mach. Co., Hamilton.
Southwark Foundry & Machine Co., Philadelphia.
Wm. Tod Company, Youngstown, O.

Pumps, all Kinds.
Can. Buffalo Forge Co., Montreal.
Charles F. Elmes Eng. Works, Chicago
Darling Brothers, Montreal.
General Supply Co. of Canada, Ltd., Ottawa.
Owen Sound Iron Works Co., Owen Sound.
William R Perrin, Ltd., Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.
Watson-Stillman Co., Aldene, N.J.

Pumps, Electrically Driven.
D'Olier Centrifugal Pump & Mach. Co., Philadelphia, Pa.
The Smart-Turner Mach. Co., Hamilton.

Pumps, Hydraulic.
Can. Boomer & Boschert Press Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
Darling Brothers, Montreal.
Smart Turner Mach. Co., Hamilton
Southwark Foundry & Machine Co., Philadelphia.
Wm. R. Perrin, Ltd., Toronto.
Wm. Tod Co., Youngstown, O.
Watson-Stillman Co., Aldene, N.J.

Pumps for Oiling Systems.
S. F. Bowser & Co., Fort Wayne, Ind.

Pumps, Steam.
Darling Brothers, Montreal.
Smart-Turner Mach. Co., Hamilton.
Wm. Tod Company, Youngstown, O.

Pump Leathers.
Graton & Knight Mfg. Co., Montreal.
Southwark Foundry & Machine Co., Philadelphia.

Punches and Dies.
W. H. Banfield & Sons, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Buffalo Forge Co., Montreal.
Can. Fairbanks-Morse Co., Montreal.
Scott Bros., Halifax, Eng.
Gardner, Robt., & Son, Montreal.
Globe Machine & Stamping Co.
A. B. Jardine & Co., Hespeler, Ont.
Pratt & Whitney Co., Dundas, Ont.
Toledo Machine & Tool Co., Toledo, O.

Punches, Power.
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Girard Machine & Tool Co., Philadelphia, Pa.
Niles-Bement-Pond Co., New York.
Watson-Stillman Co., Aldene, N.J.

Punches, Pneumatic.
Jno. F. Allen Co., New York.

Punching Machines, Horizontal.
Bertrams, Ltd., Edinburgh, Scotland.
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Long & Alstatter Co., Hamilton Ohio.
Niles-Bement-Pond Co., New York.

Pyrometers.
Canadian Hoskins, Limited, Walkerville, Ont.
Shore Instrument & Mfg. Co., New York City.
Thwing Instrument Co., Philadelphia, Pa.

Quartering Machines.
John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

Ratchet Wrenches.
Wells Brothers Co., Greenfield, Mass.

Railing, Iron and Brass.
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works Co., Ltd., London, Canada

Rail Benders.
Niles-Bement-Pond Co., New York.

Railroad Tools.
Can. Fairbanks-Morse Co., Montreal
Niles-Bement-Pond Co., New York

Railroad Tools, Hydraulic.
Watson-Stillman Co., Aldene, N.J

Rapping Plates.
Stevens, F. B., Detroit, Mich.

Ratchets.
Keystone Mfg. Co., Buffalo, N.Y.

Raw Hide Pinions.
Gardner, Robt., & Son, Montreal.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Smart-Turner Machine Co., Hamilton, Ont.

Reamers, Adjustable.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Wells Brothers Co., Greenfield, Mass.

Reamers, Bridge, Expanding and High Speed.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.

Reamer Fluting Machines.
Garvin Machine Co., New York.

Reamers, Pipe, Cylinder and Locomotive.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Reaming Machines, Pneumatic.
Cleveland Pneumatic Tool Co., of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago.

Reamers, Steel Taper and Self-Feeding.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Wilt Twist Drill Co., of Canada, Ltd., Walkerville, Ont.

Rebuilt Machine Tools.
New York Machy. Co., New York.

Reels.
Baird Machine Co., Bridgeport, Conn.

Rheostats.
Toronto & Hamilton Electric Co., Hamilton, Ont.

Rivet Machines.
Buffalo Forge Co., Buffalo, N.Y.
National Machinery Co., Tiffin, O.

Rivets, Tubular, Bifurcated.
Parmenter & Bulloch Co., Gananoque

Rivets, Iron, Copper and Brass.
Parmenter & Bulloch Co., Gananoque.

Riveters, Pneumatic, Hydraulic. Hammer, Compression.
Jno. F. Allen Co., New York.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co. of Chicago, Ill.
Mesta Machine Co., Pittsburg, Pa.
National Mach. & Sup. Co., Hamilton
Niles-Bement-Pond Co., New York.
Southwark Foundry & Machine Co., Philadelphia.
Watson-Stillman Co., Aldene, N.J.

Riveting Machines, Elastic Rotary Blow.
Girard Machine & Tool Co., Philadelphia, Pa.
Grant Mfg. & Machine Co., Bridgeport, Conn.
High-Speed Hammer Co., Rochester, N.Y.
F. B. Shuster Co., New Haven, Conn.
Southwark Foundry & Machine Co., Philadelphia.

Rolls, Bending.
John Bertram & Sons Co., Dundas Ont
Brown, Boggs Co., Ltd., Hamilton, Canada.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.

Rolling Mill Machinery.
Mesta Machine Co., Pittsburg, Pa.
Wm. Tod Co., Youngstown O.

Roofing.
Can. H. W. Johns-Manville Co., Ltd., Toronto.

Rotary Converters.
A. R. Williams Machy. Co., Toronto.
Toronto and Hamilton Electric Co., Hamilton.

Rubbers.
L. S. Tarshis & Sons, Montreal.

Rubber Mill Machinery.
Bertrams, Ltd., Edinburgh, Scotland
Can. H. W. Johns-Manville Co., Ltd Toronto.

Rules.
Brown & Sharpe Mfg. Co., Providence, R.I.
James Chesterman & Co., Ltd., Sheffield, Eng.
L. S. Starrett Co., Athol, Mass.

Safety Set Screws.
Allen Mfg. Co., Inc., Hartford, Conn.

Sand Blasts.
Curtis Pneumatic Machinery Co., St. Louis, Mo.

No, Stevens' Stopper won't stop a train, but it will stop the blow hole in a defective casting so that you cannot find it.

In this way, it helps your bank account. The casting that otherwise would have to go to the scrap heap can be converted into good coin of the realm.

Same color as the rest of the casting. Doesn't look like a blue patch on Casey's faded overalls.

How to use Stevens' Stopper, or Circle Cement:

Stevens' Stopper is a fine powder, used with a little water and made into a paste—the hole is easily filled with a putty knife or trowel. It takes anywhere from two to twenty-four hours, depending upon the size of the patch, for the filler to become as hard as the casting itself. When rubbed with a file it shows the color of the casting, hence it is the best filler and the one thing that saves your castings, and that means the saving of your dollars.

Another thing—I do not ask a fancy price for it.

A pound will save many dollars' worth of castings. Put up in 5-lb., 10-lb., and 25-lb. cans.

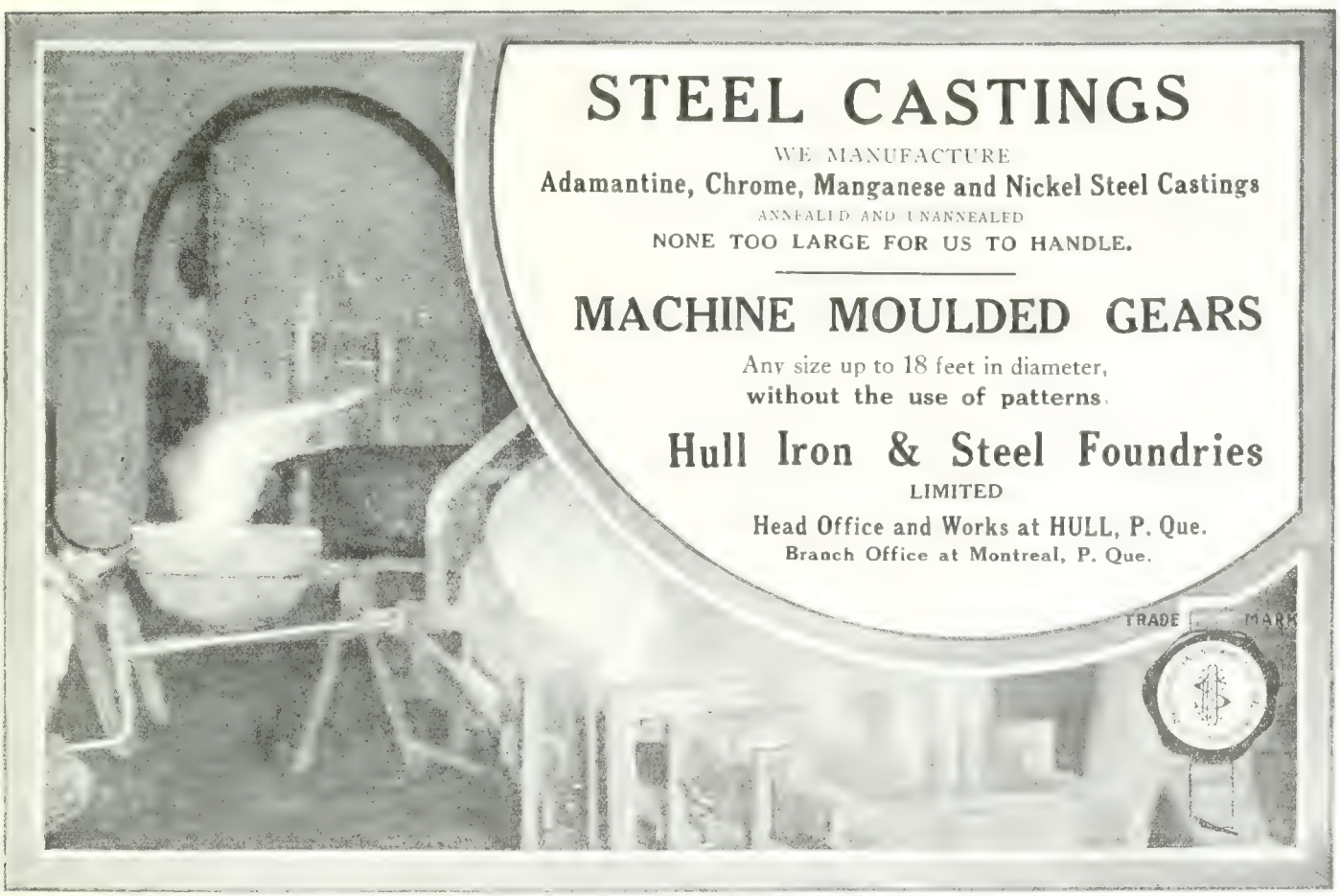
FREDERIC B. STEVENS

Manufacturer of
Foundry Facings and Supplies, Buffing Compositions
and Platers' Supplies

Corner Larned and Third Sts. DETROIT, MICH.

BRANCHES

WINDSOR, ONTARIO, 20 PITT STREET
INDIANAPOLIS, IND., 138-140 SOUTH DELAWARE STREET


STEEL CASTINGS
WE MANUFACTURE
Adamantine, Chrome, Manganese and Nickel Steel Castings
ANNEALED AND UNANNEALED
NONE TOO LARGE FOR US TO HANDLE.
MACHINE MOULDED GEARS
Any size up to 18 feet in diameter,
without the use of patterns.
Hull Iron & Steel Foundries
LIMITED
Head Office and Works at HULL, P. Que.
Branch Office at Montreal, P. Que.
TRADE
MARK

Sand Blast Systems.
Wallace Foundry Equipment Co., Hamilton.

Saw Blades.
Diamond Saw & Stamping Works, Buffalo, N.Y.

Saw Tables.
Hub Machine Welding & Contracting Co., Philadelphia, Pa.

Saw Sharpening Machines.
Nutter & Barnes Co., Hinsdale, N.H.

Saw Mill Machinery.
A. R. Williams Machy. Co., Toronto
Can. Fairbanks-Morse Co., Montreal.
Gardner, Robt. & Son, Montreal.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
National Mach. & Sup. Co., Hamilton.
Plessisville Foundry, Plessisville, Que.

Saws, High-Speed, Friction.
Hunter Saw & Machine Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
Nutter & Barnes Co., Hinsdale, N.H.

Saws, Inserted Tooth.
Tabor Mfg. Co., Philadelphia, Pa.

Saws, Hack.
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Works, Buffalo.
Ford Smith Machine Co., Hamilton.
Garvin Machine Co., New York.
L. S. Starrett Co., Athol, Mass.

Saws, Circular Metal.
Hub Machine Welding & Contracting Co., Philadelphia, Pa.
Hunter Saw & Machine Co., Pittsburg, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

Saws, Hot and Cold.
Hunter Saw & Machine Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburgh.
Nutter & Barnes Co., Hinsdale, N.H.

Scleroscopes.
Shore Instrument & Mfg. Co., New York City.

Scrap Iron.
L. S. Tarshis & Sons, Montreal.

Screw Machine Products.
Wallace, Barnes Co., Bristol, Conn.

Screw Machines, Hand, Automatic.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal
Garvin Machine Co., New York.
Girard Machine & Tool Co., Philadelphia, Pa.
Hill, Clarke & Co., of Chicago, Chicago, Ill.
A. B. Jardine & Co., Hespeler.
Moteh & Merryweather Machy. Co., Cleveland, O.
National Mach. & Sup. Co., Hamilton.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto
Windsor Machine Co., Windsor, Vt.

Screw Machines, Multiple Spindle.
New Britain Machine Co., New Britain, Conn.
Windsor Machine Co., Windsor, Vt.

Screw Plates.
Butterfield & Co., Rock Island, Que.
Can. Tap & Die Co., Galt, Ont.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Machine Co., New Bedford.
Wells Brothers Co., Greenfield, Mass.
Wiley & Russell Co., Greenfield, Mass.

Screw Slotters
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont

Set Screws, Safety.
Allen Mfg. Co., Hartford, Conn.

Second-Hand Machinery.
New York Machinery Co., New York.
Gardner, Robt. & Son, Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Gardner, Robt. & Son, Montreal.
National Mach. & Sup. Co., Hamilton.
Niles-Bement-Pond Co., New York.
Plessisville Foundry, Plessisville, Que.
The Smart-Turner Machine Co., Hamilton.
Union Drawn Steel Co., Hamilton.

Shanks, Straight and Taper.
Jacobs Mfg. Co., Hartford, Conn.

Shapers.
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machy. Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Girard Machine & Tool Co., Philadelphia, Pa.
Hendey Machine Co., Torrington, Ct.
Hill, Clarke & Co., of Chicago, Chicago, Ill.

Shafting.
A. R. Williams Machy. Co., Toronto.
Can. Fairbanks-Morse Co., Montreal
Mesta Machine Co., Pittsburg, Pa.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.

Sharpening Stones.
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

Shavings, Separators.
Can. Buffalo Forge Co., Montreal.
Sheldons, Ltd., Galt, Ont.

Shearing Machines, Angle Iron, Bar and Gate.
John Bertram & Sons Co., Dundas.
Bertrams, Ltd., Edinburgh, Scotland.
Girard Machine & Tool Co., Philadelphia, Pa.
A. B. Jardine & Co., Hespeler.
Long & Alstatter, Hamilton, Ohio.
Mesta Machine Co., Pittsburg, Pa.
Niles-Bement-Pond Co., New York.
Scott Bros., Halifax, Eng.
Toledo Machine & Tool Co., Toledo.

Shears, Power.
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown Boggs Co., Ltd., Hamilton, Canada.
Buffalo Forge Co., Buffalo, N.Y.
Girard Machine & Tool Co., Philadelphia, Pa.
Mesta Machine Co., Pittsburg, Pa.
National Machy. Co., Tiffin, Ohio
National Mach. & Sup. Co., Hamilton
Niles-Bement-Pond Co., New York.
Scott Bros., Halifax, Eng.
Toledo Machine & Tool Co., Toledo.

Shears, Lever, Hydraulic.
Mesta Machine Co., Pittsburg, Pa.
Watson-Stillman Co., Aldene, N.J.

Shears, Pneumatic.
John F. Allen Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio.

Shears, Squaring.
Brown, Boggs, & Co., Hamilton, Can

Sheet Metal Working Tools.
Baird Machine Co., Bridgeport, Conn
Bliss, E. W., Co., Brooklyn, N.Y
Brown, Boggs & Co., Hamilton, Can
Steel Bending Brake Works, Ltd., Chatham, Ont

Sheet Metal Stampings.
Duncan Electrical Co., Montreal.

Shell Banding Machines, Hydraulic.
Wm. Cramp & Sons Ship & Engine Bldg. Co., Philadelphia, Pa.
Can. Locomotive Co., Kingston, Ont.
Goldie & McCulloch Co., Galt, Ont.
Lymburner, Ltd., Montreal.
Moteh & Merryweather Machy. Co., Cleveland, O.
Watson-Stillman Co., Aldene, N.J.
West Tire Setter Co., Rochester, N.Y.

Shell Lathes.
Garlock Machinery, Toronto.
Jenckes Machine Co., Sherbrooke, Que.
Kellogg & Co., Toronto.

Shell Manufacturing Tools.
Amalgamated Machinery Corporation Chicago, Ill.
Frank Toomey, Inc., Philadelphia, Pa.
Garlock-Machinery, Toronto.
New York Machinery Exchange, New York.
Hill, Clarke & Co. of Chicago

Shell Painting Machine.
Can. Buffalo Forge Co., Montreal.
Can. Locomotive Co., Kingston, Ont.

Shell Screws, Headless.
Blake & Johnson, Waterbury, Conn.

Shell Riveters.
Grant Mfg. & Machine Co., Bridgeport, Conn.

Shelving, Steel Partitions.
Canadian Steel Products Company, Montreal

Sherardizing
[illegible] Ltd., Toronto

Shrapnel Shell Marker.
Brown-Boggs Co., Hamilton, Ont.
Holden-Morgan Co., Toronto
Noble & Westbrook Mfg. Co., Hartford, Conn.

Shrapnel Sand Blasts.
W. W. Sly Mfg. Co., Cleveland, O.

Side Tools.
Armstrong Bros. Tool Co., Chicago.

Sirens, Electric.
Lintz-Porter Co., Toronto.

Silver Solder.
Geo. H. Lees & Co., Ltd., Hamilton, Ont.

Slotters.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.

Smokestacks.
Plessisville Foundry, Plessisville, Que.

Sockets.
Brown & Sharpe Mfg. Co., Providence, R.I.
Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.
Whitman & Barnes Mfg. Co., St Catharines, Ont.
J. H. Williams Co., Brooklyn, N.Y

Soldering Irons.
Brown, Boggs & Co., Hamilton, Can.

Solders.
Tallman Brass & Metal Co., Hamilton.

Specialties, Electric.
Lintz-Porter Co., Toronto.

Special Machinery.
Armstrong Bros., Toronto.
W. H. Banfield & Sons, Toronto.
John Bertram & Sons Co., Dundas.
Baird Machine Co., Bridgeport, Conn
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Can. Fairbanks-Morse Co., Montreal.
Canada Machy. Agency, Montreal.
Cunningham & Sons, St. Catharines, Ont.
Charles F. Elmes Eng. Works, Chicago
Ford-Smith Machine Co., Hamilton.
Garvin Machine Co., New York.
Gooley & Eglund, Inc., Courtland, N.Y.
Giant Mfg. & Machy. Co., Bridgeport, Conn.
John H. Hall & Sons, Brantford.
Jardine, A. B., & Co., Hespeler.
National Electric Welder Co., Warren, Ohio.
National Forge & Tool Co., Erie, Pa.
National Mach. & Sup. Co., Hamilton
Plessisville Foundry, Plessisville, Que.
Smart-Turner Machine Co., Hamilton Ont.
William R. Perrin, Ltd., Toronto.
Wm. Tod Company, Youngstown, O

Spike Machines.
The Smart-Turner Machine Co., Hamilton.

Spring Coilers.
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.

Springs, Machinery.
Cleveland Wire Spring Co., Cleveland
Jas. Steele, Ltd., Guelph, Ont.
Wallace, Barnes Co., Bristol, Conn.

Spring Making Machinery (Automatic).
Baird Machine Co., Bridgeport, Conn.

Sprockets, Chain.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.

Stairs, Iron.
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works Co., Ltd., London, Canada.

Stamping.
Duncan Electrical Co., Montreal.

Stamping Machinery.
Brown, Boggs & Co., Hamilton, Can.

Stationary Ladders.
New Britain Machine Co., New Britain, Conn.

Steam Specialties.
General Supply Co. of Canada, Ltd., Ottawa.
Sheldons, Ltd., Galt, Ont.

Steam Separators and Traps.
Can. Fairbanks-Morse Co., Montreal
Can. Sirocco Co., Ltd., Windsor, Ont.
Sheldons, Ltd., Galt, Ont.
The Smart-Turner Machine Co., Hamilton.

Steel Alloy.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

Steel Chains for Pulp Mill and Saw Mill.
Plessisville Foundry, Plessisville, Que.

Steel Barrels.
Smart-Turner Machine Co., Hamilton, Ont.

Steel Bench Legs.
New Britain Machine Co., New Britain, Conn.

Steel Bending Brakes.
Steel Bending Brake Works, Ltd., Chatham, Ont.

Steel, Cold Rolled.
Can. Drawn Steel Co., Hamilton, Ont
A. C. Leslie & Co., Ltd., Montreal.
Union Drawn Steel Co., Hamilton Ont.
Wallace, Barnes Co., Bristol, Conn.

Steel Drums.
Smart-Turner Machine Co., Hamilton, Ont.

Steel Pressure Blowers.
Can. Buffalo Forge Co., Montreal.
Can. Fairbanks-Morse Co., Montreal
Sheldons, Ltd., Galt, Ont.

Steel, all kinds.
Lackawanna Steel Co., Lackawanna, N.Y.

Steel, High Speed.
Armstrong Whitworth of Canada, Ltd., Montreal.
Can. Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Ltd., Montreal.
Thos. Firth & Sons, Montreal.
Hawkridge Bros. Co., Boston, Mass.
National Mach. & Sup. Co., Hamilton.
Vanadium Alloys Steel Co., Pittsburg, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

Steel Die Engraving.
Noble & Westbrook Mfg. Co., Hartford, Conn.

Steel Machinery.
Hawkridge Bros. Co., Boston, Mass.

Steel Vanadium.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

Stock Racks for Bars, Piping, Etc.
New Britain Machine Co., New Britain, Conn.

Stocks for Dies.
Wells Bros. Co., Greenfield, Mass.

Stocks, Pipe.
Butterfield & Co., Rock Island, Que.
Greenfield Tap & Die Corporation, Greenfield, Mass.

Stools, Steel, Shop.
Dennis Wire & Iron Works Co., Ltd., London, Canada.

Storage Systems.
S. F. Bowser & Co., Fort Wayne, Ind.

Stoves, Electric.
Lintz-Porter Co., Toronto.

Straight Edges.
Steel Bending Brake Works, Ltd., Chatham, Ont.

Straightening Machinery.
Baird Machine Co., Bridgeport, Conn.
Bertrams, Ltd., Edinburgh, Scotland
National Mach. & Sup. Co., Hamilton

Structural Steel.
Hamilton Bridge Works Co., Hamilton, Ont.
Lackawanna Steel Co., Lackawanna, N.Y.
Owen Sound Iron Works Co., Owen Sound, Ont.

Stud Driver.
Keystone Mfg. Co., Buffalo, N.Y.

Switchboards and Telephones.
Lintz-Porter Co., Toronto.
Toronto & Hamilton Electric Co., Hamilton.

Switches, Railway.
National Mach. & Sup. Co., Hamilton.

Tanks, Oil, Etc.
S. F. Bowser & Co., Fort Wayne, Ind.

Tanks, Steel.
John Inglis Co., Toronto.
Plessisville Foundry, Plessisville, Que
Toronto Iron Works, Ltd., Toronto.

Tanks, Pressure.
Toronto Iron Works, Ltd., Toronto.

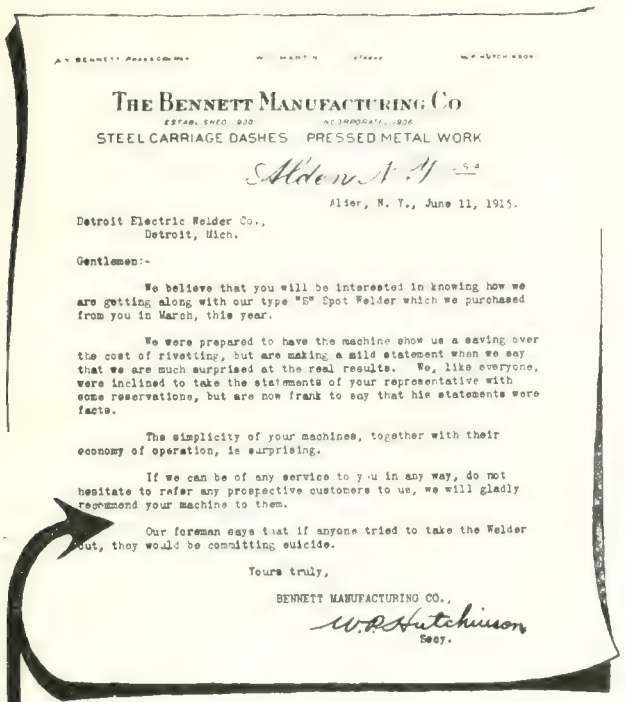
Tank Wagons.
Toronto Iron Works, Ltd., Toronto.

Tapes, Measuring.
James Chesterman & Co., Ltd., Sheffield, Eng.

Tapes, Friction.
Can. H. W. Johns-Manville Co., Ltd., Toronto.

Tapping Machines (Pneumatic).
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago, Ill.

Tapping Machines and Attachments.
Baker Brothers, Toledo, O.
John Bertram & Sons Co., Dundas.
Garvin Machine Co., New York.
The Geometric Tool Co., New Haven
Girard Machine & Tool Co., Philadelphia, Pa.
Greenfield Tap & Die Corporation, Greenfield, Mass.
J. H. Hall & Sons, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
Manufacturers Equipment Co., Chicago, Ill.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit
Niles-Bement-Pond Co., New York.
Rickart Shaper Co., Erie, Pa.
L. S. Starrett Co., Athol, Mass.



THE BENNETT MANUFACTURING CO
ESTABLISHED 1900 INCORPORATED 1906
STEEL CARRIAGE DASHES PRESSED METAL WORK

Alden N. Y. U.S.A.

Alden, N. Y., June 11, 1915.

Detroit Electric Welder Co.,
Detroit, Mich.

Gentlemen:-

We believe that you will be interested in knowing how we are getting along with our type "S" Spot Welder which we purchased from you in March, this year.

We were prepared to have the machine show us a saving over the cost of rivetting, but are making a mild statement when we say that we are much surprised at the real results. We, like everyone, were inclined to take the statements of your representative with some reservations, but are now frank to say that his statements were facts.

The simplicity of your machines, together with their economy of operation, is surprising.

If we can be of any service to you in any way, do not hesitate to refer any prospective customers to us, we will gladly recommend your machine to them.

Our foreman says that if anyone tried to take the Welder out, they would be committing suicide.

Yours truly,

BENNETT MANUFACTURING CO.,
W. R. Hutchinson
Secy.

VOLLANIZING

Don't Commit Hari Kari

You can Vollanize your factory without getting into difficulties with the foreman of the Bennett Manufacturing Company.

But you cannot be without a Vollans Electric Welder without committing commercial suicide.

The Vollans Electric Welder is the magnet that draws the interest of some of the largest manufacturers in their respective lines in America.

Ask the Ford Motor Co. of Canada, Sterling Motor Co., Detroit; Theodore Kuntz Co., Cleveland; Reo Motor Car Co., Lansing; Shaw-Walker Co., Muskegon; Chevrolet Motor Co., Flint; Detroit Pressed Steel Co., and hundreds of others what Vollanizing has saved in time and money over old methods of soldering and riveting; **And over all other types of Electric Welders.**

Remember You cannot Vollanize on any other machine except a Vollans.

Vollanizing has made a saving as high as 300% over other methods.

Vollans Butt and Spot Welders are made in various sizes to handle all grades of work—from the lightest up to ¼" stock.

We fit the machine to your purpose. Write us for information. We'll tell you what you need.

DETROIT ELECTRIC WELDER CO., 257 Lafayette Ave. West DETROIT, MICH.

Nova Scotia Steel and Coal Company, Ltd.

BEG TO ANNOUNCE

That their new Steam-hydraulic Forge Shop is now in operation, as also is their recently installed "Harmet" Fluid Compression Plant.

These improvements bring "Scotia's" Equipment abreast of the best foreign forges.

They are accordingly open to supply forgings of all shapes and sizes, made of Best Ordinary or Fluid Compressed Open-hearth Steel, and satisfying the most severe specifications.

For prices and particulars apply to

Western Sales Office, Room 14, Windsor Hotel, Montreal, Que., or Head Office, New Glasgow, Nova Scotia

Tap Chucks.
Wells Bros., Greenfield, Mass.

Taps, Adjustable.
Geometric Tool Co., New Haven.
Manufacturers Equipment Co., Chicago, Ill.
Murchey Machine & Tool Co., Detroit.

Taps, Dies and Wrenches.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Can. Tap & Die Co., Galt, Ont.
Cleveland Twist Drill Co., Cleveland
Geometric Tool Co., New Haven, Conn.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Machine Co., New Bedford.
Murchey Machine & Tool Co., Detroit.
Pratt & Whitney Co., Dundas, Ont.
L. S. Starrett Co., Athol, Mass.
Wells Brothers Co., Greenfield, Mass.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Technical Books.
The MacLean Publishing Co., Ltd., Toronto.

Telephone Systems.
Lintz-Porter Co., Toronto.

Testing Instruments, Metallurgical.
Shore Instrument & Mfg. Co., New York City.

Testing Laboratories.
Can. Inspection & Testing Laboratories, Ltd., Montreal.
Toronto Testing Laboratory, Toronto.

Thread Cutting Machines.
Can. Fairbanks-Morse Co., Montreal.
Garvin Machine Co., New York.
Geometric Tool Co., New Haven, Conn.
Girard Machine & Tool Co., Philadelphia, Pa.
Greenfield Tap & Die Corporation, Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
Pratt & Whitney Co., Dundas, Ont.
National Machy. Co., Tiffin, Ohio.

Time Clocks.
International Time Recording Co Toronto.
Lintz-Porter Co., Toronto.

Tinsmiths' Tools.
Brown, Boggs & Co., Hamilton, Can.
Steel Bending Brake Works, Ltd., Chatham, Ont.

Tire Setting Machines, Hydraulic.
William R. Perrin, Ltd., Toronto.
West Tire Setter Co., Rochester, N.Y.

Tire, Wheels.
Wells Bros. Co., Greenfield, Mass.

Toolmakers' Files.
American Swiss File & Tool Co., New York.

Tool Boxes, Steel.
Can. Steel Products Co., Montreal.

Tool Holders.
Armstrong Bros. Tool Co., Chicago.
Cleveland Twist Drill Co., Cleveland.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
J. H. Williams Co., Brooklyn, N.Y.

Tool Room Partitions.
Can. Wire & Iron Goods Co., Hamilton.

Tool Posts, Lathe.
Armstrong Bros. Tool Co., Chicago.

Tool Steel.
Armstrong, Whitworth, Ltd., of Canada, Montreal.
Can. Fairbanks-Morse Co., Montreal.
Thos. Firth & Sons, Montreal.
Hawkridge Bros. Co., Boston, Mass.
A. C. Leslie & Co., Ltd., Montreal.
National Mach. & Sup. Co., Hamilton.
Vulcan Crucible Steel Co., Aliquippa, Pa.

Tools, Blacksmiths', Etc.
A. R. Williams Machy. Co., Toronto.

Tools, Electrical.
A. R. Williams Machy. Co., Toronto.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
United States Elec. Tool Co., Cincinnati, O.

Tools, Lathe, Planer and Slotter.
Armstrong Bros. Tool Co., Chicago.

Torches, Steel.
Stevens, F. B. Detroit, Mich.
Armstrong, Whitworth of Canada Ltd., Montreal.

Truck Bits.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Track Systems.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

Track Tools.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Can. Fairbanks-Morse Co., Montreal.

Transformers and Converters.
A. R. Williams Machy. Co., Toronto.
Can. Fairbanks-Morse Co., Montreal.
Toronto & Hamilton Electric Co., Hamilton, Ont.

Transmission Machinery.
American Pulley Co., Philadelphia, Pa
A. R. Williams Machy. Co., Toronto.
Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Hamilton Gear & Mach. Co., Toronto.
Jones & Glassco, Montreal.
Main Belting Co., Montreal.
Morse Chain Co., Ithaca, N.Y.
Plessisville Foundry, Plessisville, Que
F. Reddaway & Co., Montreal.
The Smart-Turner Machine Co., Hamilton.

Transmission Towers.
Can. Bridge Co., Walkerville, Ont.
Canadian Ingersoll-Rand Co., Ltd., Montreal.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Northern Crane Works, Walkerville.
Tallman Brass & Metal Co., Hamilton.

Traveling Cranes.
Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

Trolley Hoists, Electric.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

Trucks, Lumber and Kiln.
Sheldons, Ltd., Galt, Ont.
Northern Crane Works, Walkerville.

Trucks, Factory, Freight, Etc.
Chambers, Ltd., Toronto.
Chapman Double Ball Bearing Co., Toronto
General Supply Co. of Canada, Ltd., Ottawa.
Whiting Foundry Equipment Co., Harvey, Ill.

Tube Expanders (Rollers).
A. B. Jardine & Co., Hespeler.
Watson-Stillman Co., Aldene, N.J.

Tumbling Barrels.
Baird Machine Co., Bridgeport, Conn.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

Turbines, Steam.
Southwark Foundry & Machine Co., Philadelphia, Pa.

Turnbuckles.
Canadian Billings & Spencer, Ltd., Welland.
Can. H. W. Johns-Manville Co., Ltd., Toronto.

Turret Machines.
Brown & Sharpe Mfg. Co., Providence, R.I.
Fay & Scott, Dexter, Me.
Girard Machine & Tool Co., Philadelphia, Pa.
Hill, Clarke & Co. of Chicago, Chicago, Ill.
Motch & Merryweather Machy. Co., Cleveland, O.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney, Hartford, Conn.
Turner Machine Co., Ltd., Danbury, Conn.
Warner & Swasey, Cleveland, O.

Turbines, Steam, Water.
Plessisville Foundry, Plessisville, Que.

Upsetting and Bending Machinery.
A. R. Williams Machy. Co., Toronto.
John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
A. B. Jardine & Co., Hespeler.
National Machy. Co., Tiffin, O.
Niles-Bement-Pond Co., New York.
Watson-Stillman Co., Aldene, N.J.

Vacuum Pumps.
Buffalo Forge Co., Buffalo, N.Y.
Metta Machine Co., Pittsburgh.
Smart-Turner Machine Co., Hamilton, Ont.

Valves, Foot.
Smart-Turner Mach. Co., Hamilton

Valve Grinders (Pneumatic).
Cleveland Pneumatic Tool Co. of Canada, Toronto.

Valves, Hydraulic.
Can. Boomer & Boschert Press Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
Mesta Machine Co., Pittsburg, Pa.
Southwark Foundry & Machine Co., Philadelphia.
Watson-Stillman Co., Aldene, N.J.
R. D. Wood & Co., Philadelphia, Pa.

Valve Leathers.
Graton & Knight Mfg. Co., Montreal.

Valves, Back Pressure, Steam.
Mesta Machine Co., Pittsburg, Pa.
Sneldons, Limited, Galt.

Vanadium Steel.
H. A. Drury Co., Ltd., Montreal.
Hawkridge Bros. Co., Boston, Mass.

Ventilating Apparatus.
Can. Sirocco Co., Ltd., Windsor, Ont.
Sheldons, Limited, Galt.
A. R. Williams Machy. Co., Toronto.

Vises, Bench.
Emmert Mfg. Co., Waynesboro, Pa.
Hollands Mfg. Co., Erie, Pa.
National Mach. & Sup. Co., Hamilton.
New Britain Machine Co., New Britain, Conn.

Vises, Pipe.
Armstrong Mfg. Company, Bridgeport, Conn.
Bignall & Keeler Mach. Works, Edwardsville, Ill.
Butterfield & Co., Rock Island, Que.
Emmert Mfg. Co., Waynesboro, Pa.
National Mach. & Sup. Co., Hamilton.
J. H. Williams Co., Brooklyn, N.Y.

Vises, Planer and Shaper.
Girard Machine & Tool Co., Philadelphia, Pa.
National Mach. & Sup. Co., Hamilton.
Skinner Chuck Co., New Britain, C.

Vises, Milling Machine.
National Mach. & Sup. Co., Hamilton.

Vises, Woodworking.
Emmert Mfg. Co., Waynesboro, Pa.

Washers.
Graton & Knight Mfg. Co., Worcester, Mass.
London Bolt & Hinge Works, London, Ont.
Wallace, Barnes Co., Bristol, Conn.

Washer Machines.
National Machy. Co., Tiffin, Ohio.

Waterproof Coating, Cement, Fabric.
Can. H. W. Johns-Manville Co., Ltd., Toronto.

Watchman's Clocks.
Lintz-Porter Co., Toronto.
A. R. Williams Machy. Co., Toronto.

Water Cinder Mills.
Whiting Foundry Equipment Co., Harvey, Ill.

Water Towers.
Toronto Iron Works, Ltd., Toronto.

Welding and Cutting Clamps.
Can. Blaugas Co., Ltd., Montreal.
Detroit Electric Welder Co., Detroit, Mich.
L'Air Liquide Society, Toronto.
Lever Bros., Toronto.
National Electric Welder Co., Cincinnati, O.

Welding and Cutting Work.
Can. Blaugas Co., Ltd., Montreal.
Detroit Electric Welder Co., Detroit, Mich.
L'Air Liquide Society, Toronto.
Lever Bros., Toronto.
Metals Welding Co. Cleveland, O
National Electric Welder Co., Cincinnati, O.

Welding, Autogenous.
Can. Blaugas Co., Ltd., Montreal.
Detroit Electric Welder Co., Detroit, Mich.
L'Air Liquide Society, Toronto.
Lever Bros., Toronto.
National Electric Welder Co., Cincinnati, O.

Welding, Acetylene and Oxygen
Can. Blaugas Co., Ltd., Montreal.
Detroit Electric Welder Co., Detroit, Mich.
L'Air Liquide Society, Toronto.
Lever Bros., Toronto.
Metals Welding Co. Cleveland, O
National Electric Welder Co., Cincinnati, O.

Welding Machines, Electric, etc
Can. Blaugas Co., Ltd., Montreal.
Detroit Electric Welder Co., Detroit, Mich.
Lever Bros., Toronto.
National Electric Welder Co., Cincinnati, O.
Tabor Mfg. Co., Philadelphia, Pa.

Wheels, Emery, Carborundum.
Can. Hart Wheels, Ltd., Hamilton, Ont.

Wheels, Belt, Fly, Gear and Rope.
Mesta Machine Co., Pittsburg, Pa.

Winches.
John H. Hall & Sons, Brantford.
Northern Crane Works, Walkerville.

Window Wire Guards.
Canada Wire & Iron Goods Co., Hamilton.

Wire Cloth and Perforated Metals.
Canada Wire & Iron Goods Co., Hamilton.
Dennis Wire & Iron Works Co., Ltd., London.

Wire Forms.
Wallace, Barnes Co., Bristol, Conn.

Wire Forming and Stamping Machinery.
Brown, Boggs Co., Ltd., Hamilton Canada.
F. B. Shuster Co., New Haven, Conn.
Baird Machine Co., Bridgeport, Conn.

Wire Guards and Railings.
Canada Wire & Iron Goods Co., Hamilton, Ont.

Wire Nails.
Parmenter & Bulloch Co., Gananoque.

Wire Nail Machinery.
National Machy. Co., Tiffin, Ohio.
A. R. Williams Machy. Co., Toronto.

Wire, Spring.
Wallace, Barnes Co., Bristol, Conn.

Wire Straighteners and Cutters.
Baird Machine Co., Bridgeport, Conn.
Brown, Boggs Co., Ltd., Hamilton, Canada.
F. B. Shuster Co., New Haven, Conn.

Wire Coiling and Pointing Machines.
Baird Machine Co., Bridgeport, Conn.
F. B. Shuster Co., New Haven, Conn.

Wood Boring Machines.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Machinery, Toronto.
Girard Machine & Tool Co., Philadelphia, Pa.

Woodworking Machinery.
Buffalo Forge Co., Buffalo, N.Y.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Machinery, Toronto.
Girard Machine & Tool Co., Philadelphia, Pa.
General Supply Co. of Canada Ltd., Ottawa
New Britain Machine Co., New Britain, Conn.
Plessisville Foundry, Plessisville, Que.
A. R. Williams Machy. Co., Toronto.

Wool.
L. S. Tarshis & Sons, Montreal.

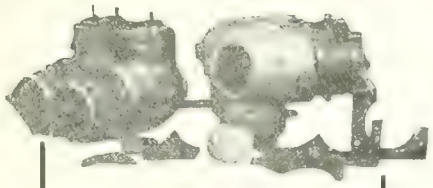
Wrenches, Compression.
Lutz-Webster Engineering Co., Inc., Philadelphia, Pa.

Wrenches.
Armstrong Bros. Tool Co., Chicago Ill.
Butterfield & Co., Rock Island, Que.
Canadian Billings & Spencer, Ltd., Welland.
Keystone Mfg. Co., Buffalo, N.Y.
Lutz-Webster Engineering Co., Inc., Philadelphia, Pa.
Wells Bros. Co., Greenfield, Mass.
J. H. Williams Co., Brooklyn N.Y.

Wrenches, Automobile Narrow Jaw and Monkey.
Bemis & Call Hardware & Tool Co Springfield, Mass.
Trimont Mfg. Co., Roxbury, Mass.

Wrenches, Pipe, Monkey.
Bemis & Call Hardware & Tool Co Springfield, Mass.
Trimont Mfg. Co., Roxbury, Mass.

Wrenches, Ratchet and Basin.
Bemis & Call Hardware & Tool Co. Springfield, Mass.
Keystone Mfg. Co., Buffalo, N.Y.
Trimont Mfg. Co., Roxbury, Mass.



A Total Wreck Salvaged

Hole in Cylinder Head.

Head of Cylinder repaired by Oxy-Blaugas.

Continuous Operation

means larger profits in shell making.

A break in a machine means heavy loss in time and labor and burden.

"Oxy-Blaugas" will repair the break immediately.

"Blaugas" is the safest gas to use, so protect our Canadian mechanics on war munitions.

Having one of our outfits will enable you to save its cost in repairing one break-down.

"Blaugas" itself is a big saving where heat is required in the process of shell manufacturing, owing to its extremely high heat value.

Write for list of its many and varied money-saving applications.

Canadian Blaugas Co., Limited

263 St. James St., Montreal, P. Q.

"CLAUDE" OXYGEN

MADE FROM LIQUID AIR

The Most Efficient — Absolutely Safe — in Purest Form—Full Measure—at Low Price—
—Delivered the day your order arrives—

OXY-ACETYLENE Welding and Cutting Plants

(Made in Canada)

as well as

Pure Dissolved Acetylene

supplied by

L'AIR LIQUIDE SOCIETY

—Three Canadian Distributing Stations—

[illegible]	[illegible]	[illegible]
WEST TORONTO	MONTREAL	WINNIPEG

—Branches the World Over—

L'Air Liquide Society, Maisonneuve,
MONTREAL, P.Q.

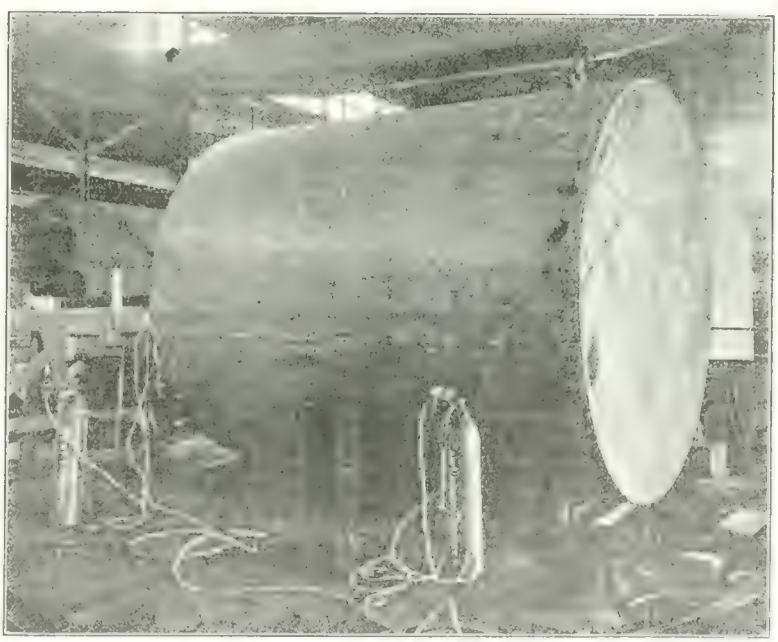
[illegible]

Name [illegible]

Address [illegible]

[illegible] Date [illegible]

Business [illegible]



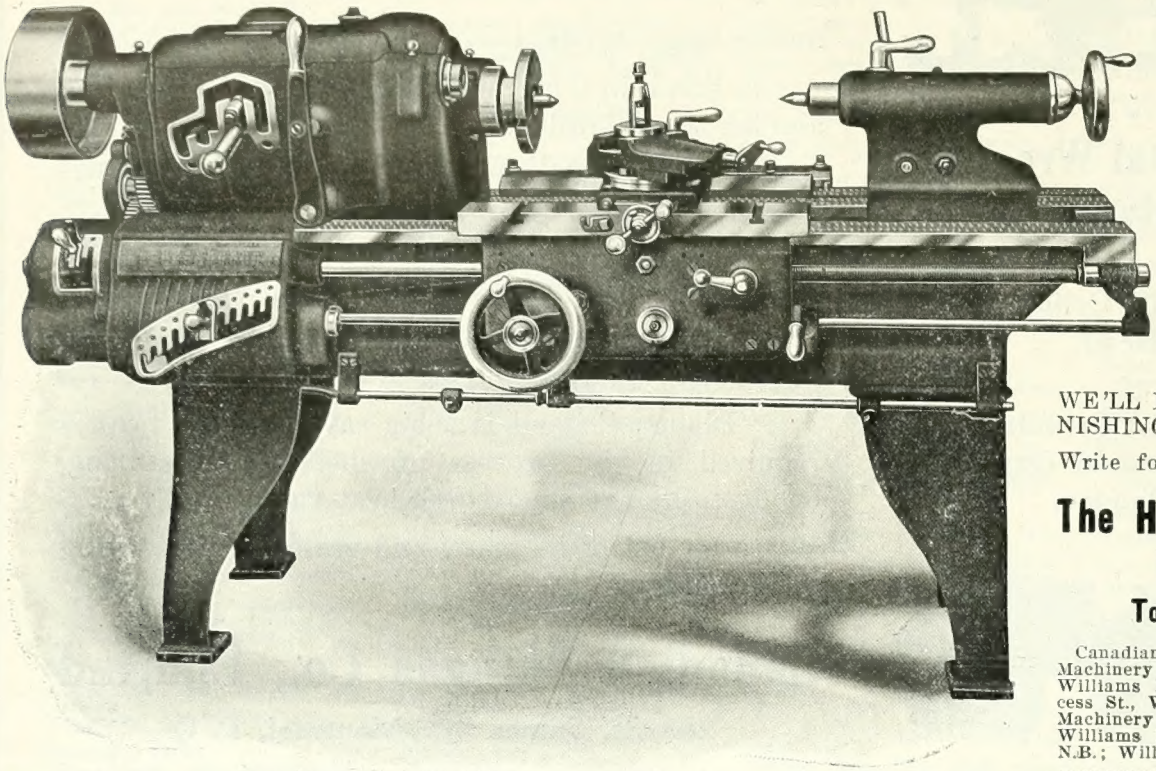
Steel Tank 10 ft. x 5 ft.—ALL WELDED—Made by [illegible]

BOILER and TANK MAKERS: WRITE US for MORE DETAILS.

THIS COUPON will bring you much information.
Do not postpone. Send Coupon NOW.

HENDEY 18-Inch GEARED HEAD LATHE

8 mechanical changes of speed for spindle with driving shaft running at constant speed, 4 direct and 4 through back gears.



36 DIFFERENT THREADS AND FEEDS are had through Mounted Change Gearing, each change being quickly made through controlling handles in Gear Boxes.

BEFORE PURCHASING A NEW LATHE INVESTIGATE THE HENDEY SERVICE.

WE'LL HELP YOU BY FURNISHING LIST OF USERS.

Write for descriptive circular.

The Hendey Machine Company

Torrington, Conn.

Canadian Agents: A. R. Williams Machinery Co., Toronto, Ont.; A. R. Williams Machinery Co., 260 Princess St., Winnipeg; A. R. Williams Machinery Co., Vancouver; A. R. Williams Machinery Co., St. John, N.B.; Williams & Wilson, Montreal.

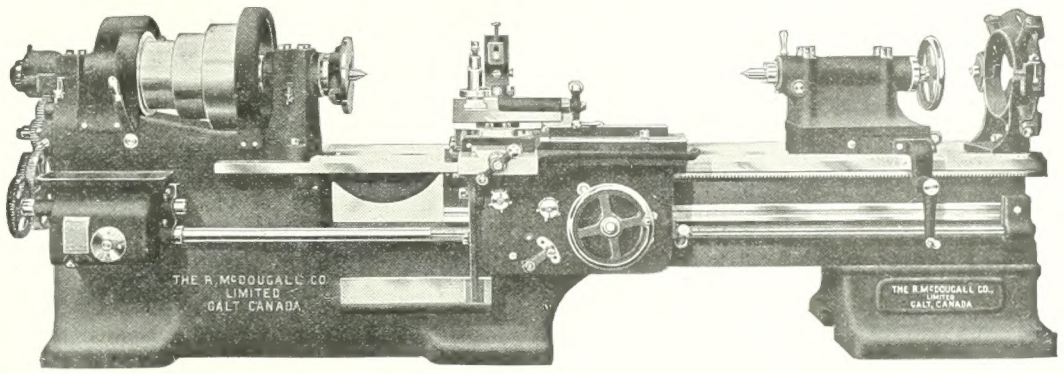
INDEX TO ADVERTISERS

Allen Mfg. Co. 51
Amalgamated Machinery Corporation 18
American Machinery Exchange 44
Armstrong Bros. Tool Co. 49
Armstrong Mfg. Co. 49
Armstrong, Whitworth, of Canada ... 14
Baird Machine Co. 50
Baker Bros. 12
Banfield & Sons, W. H. 46
Barnes Co., W. F., & John 54
Bertram, John, & Sons Co. 1
Bignall & Keeler Machine Works ... 20
Bliss Co., E. W. 15
Brown, Boggs Co., Ltd. 61
Buffalo Tool & Supply Co. 19
Butterfield & Co. 11
Canada Wire & Iron Goods Co. 63
Can. Blaugus Co., Ltd. 71
Can. Blower & Forge Co. 14
Can. Economic Lubricant Co. 52
Can. Fairbanks-Morse Co. 22
Can. Inspection & Testing Laboratories, Ltd. 50
Can. H. W. Johns-Manville Co. 65
Can. Locomotive Co. 13
Carborundum Co. 56
Cleveland Twist Drill Co. 59
Asa S. Cook Co. 63
Cramp, Wm., & Sons, Ship and Engine Building Co. 15
Cuffe-Quin, W. T. 46
Cushman Chuck Co. 59
Darling Brothers, Limited 53
Detroit Electric Welder Co 69
Diamond Saw & Stamping Co. .... —
Drury Co., H. A. 14
Durant Mfg. Co. 50
Elk Fire Brick Co. 46
Elmes Eng. Works, Charles F. 12
Fay & Scott 54
Fetherstonhaugh & Co. 46
Galt Machine Screw Co. 59
Garvin Machine Co. 50
Geometric Tool Co. 18
Girard Machine & Tool Co. 48
Globe Mach. & Stamping Co. 63
Gooley & Edlund, Inc. 55
Gorton Machine Co., Geo. .... —
Graton & Knight Mfg. Co. 21
Grant Gear Works, Inc. 51
Grant Mfg. & Machine Co. 61
Hamilton Gear & Machine Co. 50
Hamilton Motor Works, Limited .... —
Hanna & Co., M. A. 65
Hawkridge Brothers Company 42
Hendey Machine Co. 72
Hepburn, John T., Ltd. 45
Holden-Morgan Co. 13
Hull Iron & Steel Foundries 67
Hunter Saw & Machine Co. 48
Hurlbut-Rogers Machinery Co. 12
International Time Recording Co. ... 43
Jenckes Machine Co. 61
Kempsmith Mfg. Co. 9
Lackawanna Steel Co. 65
Lancashire Dynamo & Motor Co. 52
Landis Machine Co. 50
L'Air Liquide Society 71
Leslie, A. C., & Co., Ltd. 46
Lever Bros., Ltd. 65
Long & Alstatter Co. 8
Lymburner, Ltd. 55
Magnolia Metal Co. 49
Main Belting Co. 52
Manufacturers' Equipment Co. 47
Marion & Marion 46
Marshall & Huschart Machy. Co. 63
McDougall Co., R. .... Inside Back Cover
McLaren Belting Co., J. C. 50
Mechanical Engineering Co. 3
Morton Mfg. Co. 44
Murchey Machine & Tool Co. .... Outside Back Cover
National Scale Co. 51
New York Machinery Exchange 10
Nicholson File Co. 55
Northern Crane Works 63
Norton, A. O. 51
Norton Company 20
Nova Scotia Steel & Coal Co. 69
Oven Equipment & Mfg. Co. 4
Parmenter & Bulloch Co., The 48
Partridge, E. O. 54
Peter Bros. Mfg. Co. 48
Perrin, Wm. R., Ltd. 53
Plessisville Foundry 49
Positive Clutch & Pulley Works 50
Pratt & Whitney Co. .... Inside Front Cover
Puro Sanitary Drinking Fountain Co. . 42
Racine Tool & Machine Co. 61
Ridout & Maybee 46
Root, C. J., Co. 50
Rumely-Wachs Mach. Co. 44
Scott Bros. 51
Shuster Co., F. B. 49
Sly, W. W., Mfg. Co. 10
Southwark Foundry & Machine Co. 16-17
Steel Bending Brake Works, Ltd., The 50
Stevens, Frederic B. 67
Stow Mfg. Co. 54
Tate-Jones & Co., Inc. 5
Tabor Mfg. Co. 51
Tarshis, L. S., & Sons 44
Toledo Machine & Tool Co. 15
Toronto Iron Works 49
Toronto Testing Laboratory 50
Trimont Mfg. Co. 8
United States Electrical Tool Co. 59
Vanadium-Alloys Steel Co. .... Front Cover
Vulcan Crucible Steel Co. 14
WellsBros. of Canada, Ltd. 56
West Tire Setter Co. 53
Whiting Foundry Equipment Co 52
Williams Machinery Co., A. R. 41
Williams, J. H., & Co. 6
Williams Tool Co. 9

McDougall Gap Lathes

—

Strength
Accuracy
Quality



Take a look at the next money you intend to invest in a Lathe.
Then, take a look at the money's worth we offer you in our machine.
Your money will soon come back to you in increased production and we will have the pleasure of having a satisfied user. Our machines are just as good as they look and they look good too.
We invite the closest inspection.

ARE-MAC-DEE IS A GUARANTEE

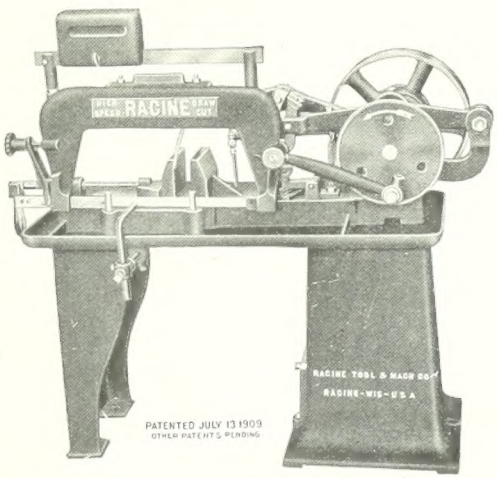
Particulars on request.

The R. McDougall Company Limited

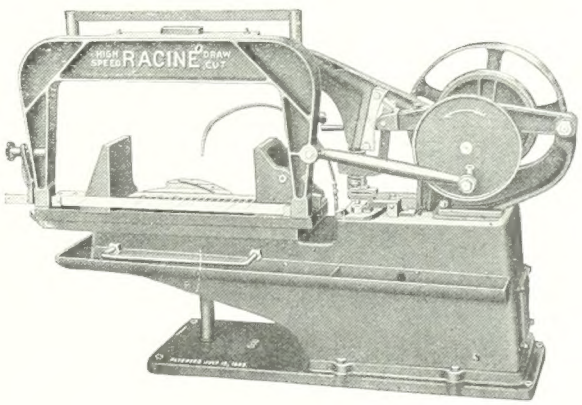
Manufacturers

GALT, Ont., Canada

The Canadian Fairbanks-Morse Co., Limited, Sales Agents.



6 in. MACHINE



12 in. MACHINE

The RACINE HIGH-SPEED METAL CUTTING MACHINE used in BATTERIES is the most Economical machine for cutting off steel billets for the manufacture of shells.

Estimated cost of cutting 500,000 3½" blanks, 50 per cent. carbon, using 30 No. 1 Racine Hack Saw Machines and Tungsten Hack Saw blades in 4½ months, including price of machines, saws, power, and labor, is 2½c per cut.

A greater capacity at lower cost of installation and up-keep, with a saving of over $11,000.00 in material on the above quantity.

For further particulars apply to

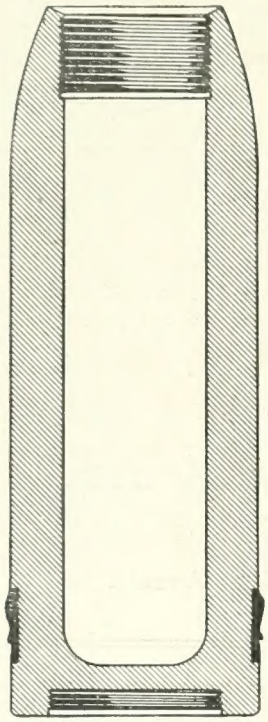
Canadian Agents

THE FOSS & HILL MACHINERY COMPANY

305 St. James Street, MONTREAL

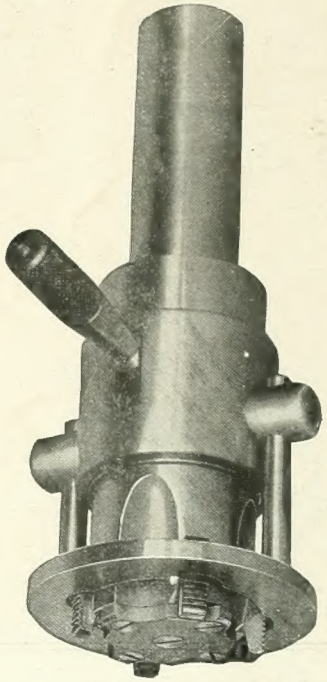
MANUFACTURING

4.5" — 6" — 9.2" — 12"



HIGH EXPLOSIVE

SHELLS



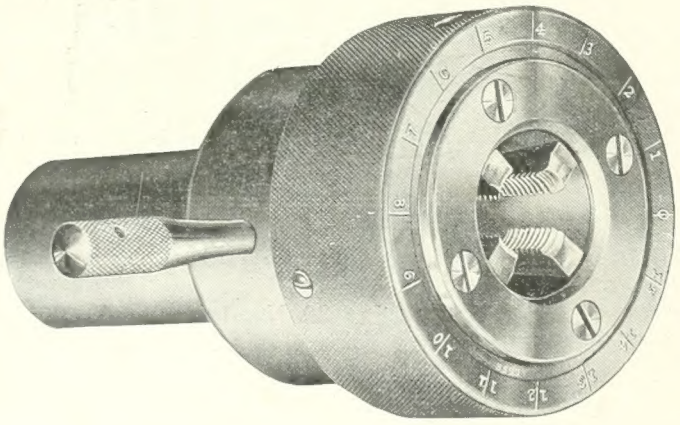
requires

MURCHEY COLLAPSING TAPS

and

MURCHEY SELF-OPENING DIES

The largest American Firms are now doing all the threading of these shells with MURCHEY TAPS and DIES and are getting fine results.



Send us B/P of your requirements and let us quote you on the necessary tools.

MURCHEY MACHINE & TOOL COMPANY

75 Porter Street, Detroit, Mich.